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EDITED BY

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ARTICLE I.

Treatment of Dental Caries, complicated with Disorders of the Pulp and Peridental Membrane. By Robert Arthur, D. D.S.

NO. III.

I propose now to consider those cases in which the caries has passed that point when it can be removed, in the performance of the necessary operations to arrest its progress without danger of injury to the pulp; or after it may have begun to exercise some injurious influence upon this part of the affected tooth.

The principal portion of these papers will be devoted to a discussion of the propriety, in certain cases, of the entire extirpation of the dental pulp, and the best means of effecting this object. And although I shall endeavor to show that this practice, in certain cases, may be pursued with great advantage, I am quite willing to admit, what, indeed, I could not deny, that when the pulp can be preserved *untouched, in a healthy condition*, it is always better that it should be done. No effort, indeed, should be spared to accomplish this most desirable object.

In treating this part of my subject, I shall present views at variance with those generally entertained in relation to it, in

the profession; views, however, the correctness of which can, I think, be clearly established, both by sound reasoning, and by facts. Although I am not aware of any publication which will bear me out in the position I am about to take, I am gratified to know, from private intercourse with some of the most intelligent members of the dental profession, that my opinions in this regard are not peculiar, and that if I am not sustained by them to the full extent to which I propose to carry them into practice, still I am so to an extent far beyond what has ever been sanctioned by any writer upon dental surgery, at present known to me.

I deny, positively, the truth of the statement so often made, that caries of the teeth will always continue to progress, after it has once set in, unless every particle of the decayed bone be removed from contact with that which is healthy. I do not believe that, when the cavity of decay is so filled, as absolutely to prevent ingress of the fluids of the mouth, that the disease ever advances; although my observations upon this point are not sufficient to furnish me with decisive proof that it is so. But I do affirm, with confidence, that a series of observations, running through a practice of ten years, have convinced me that in a vast majority of cases, caries of the teeth remains stationary, if the opening of the cavity of decay is well prepared and the cavity so filled as to exclude every thing from it, although decayed, dead and decomposed bone be left in it.

This opinion is not advanced in a spirit of self-confidence, or for the vain purpose of endeavoring to gain reputation by presenting a novelty. I state it, and shall endeavor to establish its truth, because, as I shall show, if grounded in fact, it must have a most important practical bearing.

What is the true pathology of dental caries?

After a great deal of discussion of this question, extending over a number of years, the settled opinion at the present day is, that caries or decay of the human teeth, is a decomposition of the dental substance, caused by the action of a chemical agent formed, in most cases, in the mouth, and brought into, and retained in contact with certain parts of the teeth; its action

modified by a variety of circumstances, more or less perfectly understood. I believe that this view of the nature and cause of dental caries is not now controverted.

How, indeed, can it successfully be? It is known, to demonstration, that certain kinds of acids are capable of decomposing the earthy bases entering into the structure and forming a large part of the dentine and enamel of the teeth. It has been repeatedly demonstrated that such an acid is present in the mouth of many, if not of most persons. And it is known that in cases where decay has begun, and would inevitably go on, (as, for instance, on the proximate surfaces of the teeth,) if such a change is made in them as to prevent the continued retention of the destructive agent, decay will cease to advance.

It is then, a fact, so well established by long and general observation, that I think I may take it for granted, that the exciting cause of decay of the teeth is external, and that the destructive agent, whatever it may be, is in the mouth, and exerts its influence upon the teeth, by being retained in contact with certain parts of them. Its action is, of course, modified by the original structure of the teeth.

If this be admitted, the only question having a bearing on this discussion is: Do any new elements enter into this destructive process, after it once begins, rendering its progress independent of the original cause?

I have examined, carefully, all the works on dental surgery within my reach, but find nothing in them to assist me in this inquiry. This, I believe, has never been made a subject of special investigation, and all the inferences drawn from the presentation of the general subject of caries of the teeth, point in an opposite direction.

In an extensive intercourse with intelligent members of the profession, I have frequently introduced this subject, but have not yet heard a distinct suggestion at all satisfactory to me, as to the manner in which caries of the teeth could progress, except by the action of some external solvent.

The only way, within my knowledge, that it has been attempted to be accounted for, with any show of reason, is upon

the old hypothesis of inflammation of the dentine. Now, it has many times been most conclusively shown, that in the commencement, at least, inflammation of the dentine is not the cause of caries. And even, if it may be supposed that decay is kept up, after having once set in, from this cause, in what manner could carious bone contribute to this result? I am not aware, that decayed dentine has been supposed, by any writer worthy of consideration, to contain any particularly corrosive qualities; and, if it is only inorganic matter, which it must be—simply, dental bone deprived of its vitality—I am unable to conceive of the manner in which this could serve to keep up the inflammation of the part with which it is in contact any more than the materials used for filling, which are equally inorganic. It may be objected, that the carious bone will contain some of the solvent agent in union with it, and that this is sufficient to promulgate the disease. But, it must be seen that unless a further supply were furnished, this would soon exhaust itself and become neutralized.

If it were true, that inflammation of the dentine is a sufficient cause for the continuance of its decay, then the only means of arresting it of which we know any thing, would prove worse than useless, for the direct contact with the living bone of a metallic substance, being, as it is, so good a conductor, would tend to keep up irritation instead of allaying it.

But, even if it be granted, which I do not grant, for facts show conclusively that it cannot be so, that decayed bone left in the cavity of decay could excite inflammation of the adjacent bone, I cannot conceive how this would bring about a condition of things bearing any resemblance to what occurs in the progress of dental caries. It might possibly cause death of the part; but, if after that, its decomposition could occur, I have observed no fact which would justify me in the conclusion, that the absorbent vessels of the tooth have sufficient capacity to remove the decomposed bone.

Mr. Tomes, in his account of the causes of dental caries, supposes it necessary that the dentine should first be deprived of its vitality before it can be acted upon by the decomposing

agent. But, although he makes the death of the part an essential preparation for the action of the solvent upon it, he makes the decomposition of the dental tissue absolutely and invariably dependant upon a solvent agent. How far he may be correct in his position, in relation to the deprivation of the dentine of vitality previous to the occurrence of decay, I will not now undertake to examine, It is probable, that destruction of vitality does take place before decomposition, but the agent causing the decomposition of the part is, in itself, capable of destroying its vitality, and, in my opinion, generally does so. Mr. Tomes, however, attributes this loss of vitality, in many instances, to constitutional causes acting independently of the agent producing the caries, and preparing the way for it.

A great deal has been said about the removal of the dead and decomposing dentine, in performing the operation of filling, and the necessity of cutting down to that which is sound and healthy, so as to allow no contact between the dead and living bone. But, it must not be forgotten, that the surface of the bone which is cut away, no matter how sound and healthy it may be at the time of the operation, cannot be treated in this manner without injury. Such violence as cutting across a living part cannot be done without injury to its vitality, and if injured, we know that the dentine has no power of recovering itself, and, at last, it must be seen that the surface of the cavity next the filling is dead bone, or bone partially deprived of its vitality.

If this be true, it is evident that the simple death of a part of the bone cannot produce decay in an adjacent part; for if it were so, the operation invariably resorted to for the arrest of this disease, instead of being perfectly effectual for the purpose, as it is found to be, would be the very means of propagating it more rapidly, for the death, or partial death, which amounts to the same, of a considerable part of the bone, is the invariable result of the preparation for filling of every cavity.

Judging, therefore, from a consideration of the structure of the teeth, the low degree of their vitality, the only means of which we know anything by which their decomposition is effected, I cannot but conclude that dental caries, as commonly

known, is invariably caused by the action of some solvent agent, retained long enough in contact with the bone to effect its decomposition, and that if the contact of this destructive agent can be effectually prevented, the decay cannot go on.

I am most decidedly confirmed in this opinion, by all the facts having any bearing upon the matter, which have come within my practice for a number of years. Many of these instances must have been met with by every one engaged in the practice of the profession.

A fact well known, although trifling in itself, goes a great way to establish the position I have taken; indeed, I am unable to see how such evidence can be set aside. I allude to the fact, that if a deposit of tartar takes place in a cavity of decay, the destructive process is most certainly arrested. The late Dr. Hayden, I well remember, was in the habit of saying, that if he found a decayed cavity filled with tartar, he never touched it, for the preservation of the tooth in that condition was quite certain. Now, in this case, nothing has been done toward the removal of the carious bone, upon which the tartar has been deposited—the cavity is in precisely similar condition to one in which a gold filling has been placed upon the carious bone. The objection may be made here, that the character of the saliva, from which the tartar has been deposited, is itself a sufficient reason to account for the arrest of the decay; for the very deposit is an evidence of an excess of alkaline qualities, and it must have neutralized any acid secretion present, and prevented its action upon the bone previous to its deposit. But, this objection only goes farther to establish my view of the case, for it would prove, that as soon as the action of the acid agent is interfered with, the decay is arrested. It may also be said, that there is this difference in the two cases; that the gold placed upon the decayed bone, confines in the cavity a portion of the destructive agent, which is completely neutralized before the deposit of tartar commences. But, it is only necessary again to reply, that the quantity of acid which could in such case be left in union with the decayed bone would be so trifling that as soon as a further supply was cut off it would speedily exhaust itself.

I have conversed on the subject with but few of the better practitioners of our profession, who have not admitted, that, occasionally, they regard it as good practice to leave decomposed bone in the bottom of a cavity when it was very probable, that the removal of this changed bone would lay bare the pulp. By decomposed bone I do not now mean that discolored bone which is so often thrown out by the pulp when threatened with exposure. That this practice is more commonly pursued than is generally acknowledged, I am fully satisfied. In these cases, the caries must have penetrated so nearly to the pulp, that if it continued to progress with the same rapidity with which it had gone on to this point, a few weeks or at most months, would have been sufficient to have required the removal of the filling, pulp or the tooth, and yet I have not heard the individuals here alluded to, imply that they regarded this as an operation requiring subsequent attention.

I have removed fillings in consequence of their defectiveness, which have been in place for many years, and have repeatedly found what I could not but regard as conclusive evidence, that the caries had not been entirely removed at the time the operation was performed, and yet decay had not progressed in the parts where it might have been expected to go on. It seems to me scarcely possible that this should not have been the experience of every practitioner of long standing.

I have mentioned these things as facts, probably coming within the observation of every practicing dentist. But in addition to these, I have, for several years past, been making experiments with direct reference to this particular object. The results of these observations I will, at some future time, make known more specifically to the profession. These facts, to which I have endeavored to direct attention, although they may not lead every practitioner so far in his conclusions, as they, in connexion with other facts have led me, are sufficient, I think, to establish conclusively this point, which for the present is sufficient for my purpose; that if the cavity of decay is securely filled so as perfectly to exclude the fluids of the mouth, the caries will be materially arrested. I cannot see

how, in the face of these well known facts, this can be controverted.

It is now generally admitted, that after the human teeth have attained to their destined length, a deposition of bone from the pulp generally goes on, eventually, in many cases, bringing about its entire obliteration. It is well known that this deposition of bone, from a variety of causes, goes on, at times, more rapidly than it ordinarily does, and sometimes when the pulp is threatened with exposure from decay, is thrown out in such quantity as entirely to arrest the progress of this disease. The reason why this does not always happen is, that the caries progresses so much more rapidly than this deposition of bone takes place, that the pulp becomes uncovered or brought into contact with the carious bone, and no longer performs this important function. There is no reason to believe that bone is not invariably thrown out from the pulp, and if, when this important part of the tooth is on the point of becoming uncovered, the progress of the caries can be retarded, it is no violent inference to suppose, that, in time, a thick plate of bone will be formed between it and the cavity of decay.

It is well known to the profession, that a tooth may be decayed so nearly to the pulp, that the bone in direct contact with this part, may be in a soft condition without causing any apparent inflammation or even considerable irritation of the pulp. And even in cases where some irritation is present, a degree of inflammation so high as to cause pain, does not occur. There may even be great tenderness to slight pressure, so nearly may the pulp be entirely uncovered, and yet the pulp seem unaffected by disease.

I do not suppose, however, that any portion of the healthy pulp can remain directly in contact with devitalized bone, any more than with any other inorganic substance, without suffering the usual consequences. It seems probable to me, that in those cases where the bone no longer retains its proper consistence down to the surface of the pulp, and no painful symptoms are present, that a new layer of bone has been formed on the surface of the pulp, and has not yet become hard. It may

readily be seen that in such a case as this, although healthy living bone may be in direct contact with the pulp, it would not have consistence enough to protect it from injury by external pressure. It is obvious, too, that in the attempt to remove the decayed parts near it, this new bone may be as easily removed as that which is decomposed. Pain is probably rarely experienced except when, by the caries proceeding more rapidly than this protective deposition of bone, the pulp is at last brought into direct contact with the carious bone, or so large a part is left bare as to expose it to the influence of irritating substances taken into the mouth, or of the atmospheric air. This is a matter well worthy of consideration, and it must be remembered that when directions are given for the invariable removal of every particle of soft bone from a cavity of decay, that bone which has less consistence than the rest of the tooth, may be bone in the first stages of formation.

The principal reason why I am so anxious to establish the truth of the position I have taken, is, that after the pulp once becomes fully exposed, even the smallest point, the preservation of teeth so affected, is, in my estimation, very doubtful, unless the pulp is entirely removed. The treatment of a tooth in this condition, by "capping" the pulp, as it is termed, has been warmly advocated, but I must affirm although my experience in the operation has been very limited, that I do not remember to have been completely successful in the treatment of a single case in this way. In conversations on this subject with skilful practitioners, many of them have stated this to have been their own experience.

Dr. Westcott, Journal, vol. vi, p. 112, in a strong article condemning the use of arsenic for destroying the vitality of the pulp, says of this operation, that he has "tried the experiment time and again, and has never succeeded in a single instance."

I have recently had conversations with members of the profession, who, at one time, very warmly advocated this practice, but who now express doubt as to the final result, and advise that it should be practiced with extreme caution.

I have, on the other hand, been assured by Professor Harris,

who has practiced this operation very extensively, that he had removed fillings after some time had elapsed, and found the opening, into the pulp cavity, which was quite distinct at the time of the operation, completely closed with a deposit of new bone. Professor H. also states, that he has recently met with several well marked cases, in which the pulp was extensively exposed at the time of filling, but which, on removing the fillings for examination, was covered with bone in various stages of formation.

I am aware that this operation is practiced, and is strongly commended by other gentlemen of high standing in the profession, in whose statements I have confidence; and I am quite willing to confess, that I may not yet have fallen upon the correct method of practicing it. But I carefully performed the operation in the manner directed, and so long as I am unable to obtain any more favorable results, I cannot recommend the practice.

It may be asked, why not perform this operation, even if there is a slight prospect of success; for even if it fail, you can then resort to the extreme operation of removing the pulp? The objection is this: the preservation of the tooth is endangered by this course; for it will, in many cases, scarcely be discovered that the pulp is dead, until peridental inflammation occurs, and then the chances of the success of the final operation of the extirpation of the pulp are abridged; for as I shall endeavor to show, in the proper place, the success of this operation depends, to a considerable extent, upon the healthy condition of the pulp and the peridental membrane at the time it is performed.

It must be admitted, I think, from the evidence in relation to this matter, either that the true method of performing this operation is not generally understood, or that its success is very uncertain. I cannot but doubt the possibility of the pulp throwing out new bone after it is once entirely deprived of that with which it is naturally covered, it must be brought into contact with the atmosphere, and be more or less injuriously influenced by it. My own experience, in relation to this matter, confirms me in this view of the case.

I propose, now, basing this recommendation on the general view of this subject I have presented, that in every case occurring in practice, where there is a probability of exposing the pulp by the entire removal of the decayed bone to allow it to remain, even when necessary, in considerable quantity.

Let us now consider well this class of cases. It is admitted, on all hands, that no matter how carefully performed, there is some uncertainty, slight though it may be, about the final result of the operation, having in view the entire extirpation of the pulp. Although an invaluable operation in cases where it is absolutely demanded—and such cases present themselves quite often enough—it must be acknowledged to be a last resort. The evidence in relation to the operation of capping the pulp, which I have just presented, shows, I think, that the successful result of this mode of procedure is still more uncertain. Now, admit that we cannot calculate, with any degree of certainty, what will be the consequence of filling a cavity without entirely removing the decayed bone, is it not better, until we satisfy ourselves in relation to it, to make the trial than to go on so far as to oblige us either to perform the operation, difficult, out of the reach of the purses of some of your patients, and somewhat uncertain of removing the pulp, or the still more uncertain one of "capping the nerve." We know that a deposition of bone from the pulp is slowly but certainly going on; and we have good reason to believe, that if the progress of the caries can be stayed for a sufficient time, a hard and healthy covering to the pulp will have been supplied. I have been endeavoring to show that the operation I propose, if it do not entirely arrest, will certainly retard the progress of this disease; and, even if my treatment of the subject has not been convincing, a trial, at least, when I positively assert what has been my own experience in the matter, is more than justifiable when the object to be gained is of so much importance. We know, in many of these cases, where the removal of soft bone would certainly expose the pulp, that this bone remaining in contact with the delicate structure, produces no irritation, and from all the indications presented, leaves it in a perfectly healthy con-

dition. Now, as I have already stated, it is the opinion of some of those who have extensively practiced this operation of "capping the nerve," even after it may have become exposed at a very small point, that its success is very uncertain. Others allege that they have failed in every case in which they have attempted it. Now, in view of this evidence in regard to it, is it not better to allow to remain in contact with the pulp a substance which seems to be perfectly congenial with it, and which produces no irritation, than to place in contact with it, a substance which experience shows is liable to produce the injurious results alluded to?

The following case is the best answer to these questions:

CASE.—Mr. K——, æt. about forty-five. Had occasion to perform a number of operations upon this gentleman's teeth about two years ago. On the left side of the lower jaw the dens sapientiæ alone remained. It had been decayed for a considerable time, and from its appearance I concluded that the pulp must be reached. It had given him no continued pain, however, but was exceedingly tender to pressure, so that it was quite useless for mastication. For several reasons, unnecessary to state here, I was unwilling, except as a last resort, to extirpate the pulp, and determined to make an effort to save it without resorting to this extreme measure. On examining, with an instrument, the cavity, which occupied nearly one-half the diameter of the surface of the crown, I found it extremely tender to the slightest touch, and could remove but a small portion even of the decayed bone, the greater part of which I allowed to remain in the cavity. Indeed, I did scarcely any thing more than to take away the very much softened portion. I then dried out the cavity as well as I could and filled it with tin foil. The tenderness under very slight pressure, however, was so great that I could not use force enough to make any thing like a good filling. For several weeks after this operation was performed, the tooth remained as useless as ever, but it grew, eventually, less and less tender to pressure, and after the lapse of a few months it could be used for mastication without inconvenience. In about a year the tooth again became annoying; slight pain being experienced when certain

condiments were taken into the mouth. On examination, I found that in consequence of the imperfect manner in which it had been filled, the caries had gone on at one side and formed a passage to the tender part of the cavity. I now took out the filling and found that the cavity had not increased at all in size; and I was enabled to remove the greater part of the discolored bone with but slight inconvenience to the patient until I came toward that point over one of the anterior elevations of the pulp. The rest of the cavity I prepared carefully, and again filled with tin foil so firmly, that at present, after the lapse of nearly eighteen months, it has been as useful as if it had never been touched with disease. In a few months I shall remove this tin filling, and fill firmly and finally with gold.

There is one objection to this practice; it may, like the operation of "capping" the pulp, endanger the final preservation of the tooth, if it become necessary to remove the pulp. For if the operation do not succeed perfectly, and the case is neglected, an inflammation of the peridental membrane may ensue, which will lessen the chances of the final preservation of the tooth under treatment. This difficulty may be avoided, as I think I shall be able to show, and the chances of success so greatly preponderate, and the advantages of this method of treatment are so considerable, that, in the face of this objection, I regard it as more than justifiable that this risk should be taken.

In the treatment of teeth in the condition here alluded to, there are many things requiring special attention. Most of these will doubtless suggest themselves to every practitioner of experience who can admit the correctness of the principle I have suggested. It may, however, be useful to some to state in some detail my own general method of treating these cases.

The standard to which we must refer all preservative operations on the teeth, is undoubtedly this: what can we do in each individual case, to preserve the teeth for the longest period of time in the most healthy condition.

If the ground I have taken could be established beyond a doubt, then the matter would be quite easy, for we would not

be solicitous, in any case, entirely to remove the decay from any cavity which came under treatment. But as this is a question, it is desirable in all cases to remove every trace of decay, and it becomes important to consider well the circumstances in which this may or may not be done without risk of injury to the pulp. Unless of course, this practice is not approved of, and it is thought better to expose the pulp than to leave in the cavity of decay any quantity, no matter how small, of any thing like decomposed bone.

In examining a cavity of decay we may often at once satisfy ourselves of its proximity to the pulp, by considering the class to which the affected tooth belongs, the situation and extent of the decay, the condition of the cavity and the symptoms observed by the patient. At other times it is extremely difficult, without taking such steps as will render impossible the operation here proposed, to determine whether or not the pulp has been reached by the caries.

When we are satisfied, from examination, that the caries has not nearly reached the pulp, and can be removed without danger, the course is plain.

In examining a cavity of decay when there is any reason to suspect that the pulp has been reached, I generally proceed as follows: I ask the patient if he has experienced pain? If so, of what character? If there has been none of any kind, I take it for granted that the pulp is not yet actually reached by the caries, and proceed to the preparation of the cavity.

If pain has occurred, I inquire whether it was of such character as would justify the belief that it is tooth-ache proceeding from an exposed or inflamed pulp.* If any considerable pain has occurred and continued for any length of time, the preservation of the affected tooth by the means here indicated, is very doubtful, and until some experience has been had, which will enable the operator to discriminate in these cases, it will be better to proceed at once to the extirpation of the pulp.

* I would here refer to the first of three articles published in the "Dental News Letter," on the treatment of the Dental Pulp, by Dr. J. D. White, of Philadelphia, in which the varieties of tooth-ache which occur are referred to their true causes.

If, however, the pain has been inconsiderable, indicating only some slight irritation, caused by the proximity of the caries to the pulp, or from extreme inflammation of the dentine, I proceed to a close examination of the cavity. I first wash out all loose extraneous matter, with the syringe, dry it carefully in the usual way, and examine closely with the eye. I then press firmly into the cavity with a blunt instrument, a piece of cotton or lint. If pain is produced only whilst the pressure is continued, and immediately ceases on its being removed, the indications are favorable, and I go on to the preparation of the cavity.

I first remove the carious bone from every part except that directly at the point where the pulp is most prominent. I then carefully prepare the opening of the cavity, and complete its preparation, by removing as much of the softened bone, directly over the pulp, with light touches of the instrument, as can be done with perfect safety; if there is the least danger of uncovering the pulp, I do not touch this part at all, but, without any hesitation, leave discolored and decomposed bone at the bottom of the cavity. If it will bear enough pressure, I fill with gold, firmly, and mark the case in my note book, for future examination. If there is much tenderness to pressure, I frequently cover the bottom of the cavity with a piece of gold plate, so as to relieve the most tender point, by distributing the pressure over the whole surface. In using a piece of plate for this purpose, in the upper teeth, it will be found convenient to fix it in place by warming it slightly, and touching it to a piece of gutta percha. It will take up enough, and a very slight quantity is enough to fix it in place.

Sometimes, as in the case above cited, the decay will be found so extensive as to make a temporizing course of treatment necessary. In the statement of that case, I have sufficiently indicated my mode of practice

After a filling in such cases as these is completed, either intended for a temporary purpose, or otherwise, the tooth must be carefully watched for a time. If a decided tooth-ache should occur in a tooth so treated, it is pretty conclusive evidence that

the pulp has became inflamed, and its removal will become necessary. When this is decided upon, the sooner it is done the better. If the patient should endure the pain for a few days and it should then cease, the removal of the filling and the pulp is just as imperatively called for in most cases, for the suspension of the pain is a mere delusive calm, and will, inevitably, at some future time, return in the form of a very obstinate inflammation of the peridental membrane.

It sometimes happens, and this certainly forms one of the most serious objections to the practice which I have recommended, that the pulp gradually loses its vitality, without causing any pain which the patient will notice, until peridental inflammation, which occurs sooner or later, sets in. All that can be done to guard against this evil is, to charge your patient to come to you on the occurrence of the very first symptoms of inflammation of this membrane, so that you may take advantage of the most favorable moment for treating it. After such an operation, indeed, it will be well to see your patient as often as possible, for a time, to enable you to watch the result. When the pulp dies, a change of hue of the affected tooth always takes place, and a careful examination will detect this fact long before peridental inflammation occurs. The difference between a tooth in this condition, when the pulp first dies, and one in a perfectly healthy condition is very slight, but can, at least in the teeth near the front of the mouth, be detected in a strong light by their opaque appearance. I think it may be set down as a general rule, that the pulp will be found dead when the peridental membrane is considerably inflamed, and when this occurs, the removal of the filling and pulp in cases of the kind here alluded to is indicated.

At the time of writing this sheet, I have a case in my hands strongly bearing upon this matter. A young lady, for whom I have had occasion to perform a number of operations, has been in my hands for two or three weeks. I supposed I had completed all that was necessary to be done for her, and was making a final careful examination before dismissing her, when my attention was drawn to a very slight difference in color between

the right superior lateral incisor and the adjacent teeth. I had only a day or two before filled this tooth on the lingual surface, where it was very slightly decayed. On questioning the patient, I found that several years before, she had suffered violent pain for a few days in this tooth, but that it passed away, and she had suffered no pain since. On examining it again closely, I found that it had lost that life-like semi-transparent hue which marks the living tooth, but it was so slight a shade darker than the rest of the teeth, that, although I had filled it, it escaped my notice. I removed my filling, cut down to the pulp cavity, between which and the cavity of decay, there was quite a thick plate of bone, and found that not a trace of vitality remained even to the extreme point of the canal of the root. I removed the remains of the decomposed pulp from the root and filled it carefully with gold.

After filling with tin-foil, or any other substance, for a temporary purpose, I allow the filling to remain about a year, sometimes longer, before proceeding to fill finally. I take occasion, however, to make several examinations of the case in the interim, and particularly direct my patient if any thing unusual occurs, if any difference, however slight, between this and the rest of the teeth is observed, to come to me at once.

I am aware how extremely meagre these practical directions are, and how loosely all this paper is put together, but very pressing engagements have prevented me from giving to it that calm and long continued consideration which the subject deserves. My only apology for giving it for publication, in its present imperfect condition is, that I promised it at this time, and was obliged to hand it in some form to the editor of this "Journal."

ARTICLE II.

An Essay on Artistic Dentistry. Read before the American Society of Dental Surgeons, at their Twelfth Annual Meeting, held in Philadelphia, August 5, 1851. By A. HILL, D. D. S.

GENTLEMEN OF THE AMERICAN SOCIETY:

THE subject of the present paper, I have entitled *Artistic Dentistry.* My object has been to draw out before the mind more distinctly, certain topics not generally noticed with as much particularity, as the subject seems to demand.

It has occurred to me, that this department of our profession has not received that attention from those who have written upon dental subjects, to which it is entitled.

Many able pens have been employed to much advantage, in setting forth, in all their minuteness of detail, the different *mechanical* contrivances and the various modes of their application, so far as they are considered essentially useful, to the practitioner of dental surgery.

Anatomy and physiology—chemistry and materia medica, with general therapeutics, have each contributed with a good degree of liberality, their respective quotas to ennoble and enrich this useful profession. But I respectfully submit, that neither the skill of the accomplished surgeon, nor the ingenuity of the industrious mechanic, is adequate to the full accomplishment of that which is aimed at, by the members of the dental profession, or demanded by the wants of those who require their services.

The physician may exhaust his skill in the treatment of disease—the surgeon, as a last resort, may be required to amputate a limb, or remove a dangerous cancer, and acquit himself perfectly, in the dexterous use of the *knife*, the *saw* and the *bandage;* and as the poor patient recovers, minus one or more of his limbs, his services are no longer requisite—his legitimate work is done.

The artistic skill of one, who has an eye to the beauty of *form* and *proportion*, may now be summoned, who shall mould a limb, and form a foot, with so much excellence, as to compensate to some extent for the loss, and almost rival nature herself, in its beautiful adaptations. But not so with the dentist. It is demanded and expected of him, that he fulfil the several and distinct functions of the physician and surgeon, the mechanic and artizan. He must not merely treat diseases of the mouth and teeth, in all their various relationships and multiform sympathetic connections—but he must extract, clean, regulate and restore—file and fill, and thus necessarily invade the domain of the surgeon, mechanic and artist. What wonder is it, that, comparatively, so few are competent to meet and fulfil the public expectations in these various particulars. And how sadly mistaken is he, who supposes that a few weeks, or months at most, are sufficient to qualify himself for the duties of such a profession.

In strict language, surgery may be defined to be "the act of healing by manual operation." Art, as applied to our profession, may be considered distinctively, as in those cases where the mind or the imagination is chiefly concerned, and may not improperly be classified with the more liberal, polite and elegant arts of *poetry*, *music* and *painting*. Emotions as distinct as the prismatic colors of the rainbow, are known to supply the necessary inspiration in each of the several departments. And yet, they may become blended in such a delightful manner as to leave no distinct and perceptible trace of the precise line of their union.

The difference between the mechanic and the poet, the musician and the painter, can only be properly comprehended by a careful analysis of each. It will, however, be sufficient for our present purpose, to take one or two illustrations, by which these characteristic marks of distinction may be seen, and rendered applicable to the subject we have taken in hand.

The eye of an ingenious mechanic, may sweep over a beautiful landscape, embracing

"Upland grove and dell"—or
Mountain, valley and river.

But how entirely different are his emotions from those of the genuine *poet*, *musician* or *artist*. Observe them for a moment, you will see

"The poet's eye, with a fine phrenzy rolling."

You will see his soul displaying itself over every lineament of his face, while he drinks in the delicious inspiration of the scene. The musician hears the dim

"Music of the spheres"—

The babbling music of the brawling brooks, the choral anthems of the feathered songsters, until his wrapped soul can be silent no longer. Meantime, the artist is reveling in all the beautiful combinations of light and shade—the sun-light that mildly quivers on the mountain top, and streams in softest beauty down into the valley below. And those elegant tints of multiform foliage display themselves before his vision, until he instinctively seizes the pencil and transfers them to his canvass.

How various—yet how distinct, these impressions!

The poet breaks out in a rhapsody—The musician sweeps his lyre—The artist is seated at his easil—while the mechanic is coolly and tamely querying within himself as to "what trees will make the best shingles?" and how the timber, which he sees before him, can be best made to subserve the purposes of his calling.

And these characteristic marks of distinction, are not at all peculiar to those individuals which we have named, but are a frequent matter of observation among all classes of men, and in every department of industry.

The peculiarity of which we speak, constitutes the difference between the coarse blunt form, rude spars and unwieldly movements of an old Dutch ship, or a Chinese junk, and the elegant clipper-built vessels of the present day. The former, resembling nothing but the most ungainly things, either on sea or land, and would almost puzzle a stranger to tell, whether they were ever intended for nautical purposes or not. While the latter, so beautiful in their proportions, so symmetrical in their arrangements, and perfectly adapted to the purposes for which they are

designed, may justly be said to "walk the water like a thing of life." It is the display of artistic talent, in combination with high attainments in the mechanic arts, that constitutes this difference, not merely in the cases we have cited, but in every department of genius and industry.

Having briefly called your attention to the subject, with a few illustrations designed to show more distinctly, the peculiar topic we have chosen as the subject of the present paper, we will now proceed to point out its more pertinent application to our profession.

In the manufacture, adjustment and adaptation of artificial teeth, and their appendages, this principle finds its fullest scope. No other branch of our profession offers a field so inviting and ample as this, in which to display true *artistic* skill, (as distinguished from *pure mechanical* and *scientific* attainments,) as this department of dental operations. It is absolutely indispensable here, from first to last. From the *moulding* and *carving* of the clay itself, to the *painting*, *glazing* and setting, *artistic skill* alone, can insure success.

The carving of mineral blocks is a species of sculpture, where the *truest* and most clever artist cannot fail of distinction.

Even Powers himself, were he to employ his genius upon a matter of this kind, would, I doubt not, exhibit the same masterly hand that has so exquisitely moulded the inimitable statue of the Greek slave. And that which distinguishes one piece of this kind from another, is the same thing that distinguishes all his chaste and beautiful productions from the inferior specimens of those, who would fain emulate his unrivalled excellence. And it would be almost as proper to compare some of those specimens which we sometimes see upon tomb-stones in some of our country grave yards, with those gems of art, as to institute a comparison between the productions of some who are laboring in this department of the dental profession. Great strength, some of them most undoubtedly have, and so have our New England ox carts. And they will "stand the fire." And so will the "Salamander safes." "They will do for *grinding*"—so will mill stones. And if qualifications, (which by

the way, are very essential,) are the only ones to recommend them, the day has gone by when they will be very likely to find a market.

But it affords me great pleasure to know that there are those in our own country who cater to the wants of the community in this regard, who have no need to be ashamed of their productions. And some of them, *especially*, seem to have left but little more to be desired, in order to render an artificial denture, all that the most sanguine aspirations of the profession have ever anticipated.

No specimens which I have seen, have served more to deepen this conviction upon my own mind, than some of those beautiful specimens from the laboratory of Jones, White & Co. Here is something beside those qualifications above referred to, as being common to the *ox cart*, the *salamander* and the "upper and nether mill-stones." Observe them, and you will see the delicate touches of the artist's pencil displaying the skill of something more than a *mere amateur* in this business. Those delicate shades around the festooned borders of those *gum teeth*, are such, as when properly mounted, and adapted to the mouth, almost rival nature herself, in her beautiful productions.

But I am happy to know, that these gentlemen are not alone in running this race for distinction. Others are ably competing for this prize, and to whom the final award of superior excellence will be made, is certainly more than I am able to say.

Among others, whose elegant productions are worthy of being mentioned, as further illustrative of the peculiar feature we are seeking to develop, the names of such men as *Stockton*, *Alcock*, *Morton*, *Crosby*, and many more, probably, whose specimens we have never had the good fortune to see, should not be omitted.

We thus particularise, not by any means to seem invidious, but first to illustrate this feature of our subject, and secondly to award praise where it is unquestionably due.

The rapid strides of this rapidly advancing department of our useful profession, have for the last few years been such, as almost to pass the bounds of credibility.

This advancement, especially in *artistic* dentistry, may be very clearly seen, by attending, for a moment, to the following extract from a work on dental science, published in 1834.

The work is entitled "A Treatise on the Anatomy and Physiology of the Teeth, &c., their diseases and treatment, with practical observations on artificial teeth, and rules for their construction: by DAVID WEMYSS JOBSON, M. R. C. S. E.; Dentist in ordinary to his Majesty, and to his Royal Highness, the Duke of Sussex," &c.

Now, with such a flourish of trumpets in 1834, what do we find upon the subject of artificial teeth? The following extracts from his pen will show. He says—"Artificial teeth have also of late years been made from a *porcelaneous substance*, and under the name of 'mineral' and '*terro-metallic*' teeth, have afforded an extensive range, for empirical deception. The attraction held out, is their alleged 'incorruptibility,' by which term, the unwary are entrapped and led to believe that teeth of this description are much more durable than the natural ones," (i. e. natural teeth artificially used.) "The very reverse of this is the case. For although they are not subject to change of color, yet they are in every instance so brittle, as to be easily broken off, on coming in contact with those of the opposite jaw." * * * * *

"When these mineral or china teeth were first introduced into this country from France, (for it is to our neighbors on the opposite side of the channel, that we owe these, as well as many other similar ephemeral productions,) the greatest mystery was affected on the subject of their composition, although many of our potters or porcelain makers, could easily have disclosed it." * * * *

"The most extravagant expectations were then formed from them, although few, or rather none of the advantages which they were supposed to possess, have been realized, and they are now considered to be a complete failure. They have never been much used by the leading dentists of the day, and I believe are now wholly discountenanced by the respectable part

of the profession, although they still reign paramount with the disreputable."

This extract, although somewhat lengthy, seems to show, in a very clear light, the progress of *artistic* dentistry, (at least in this country,) within the last ten or fifteen years. And I am thinking, that if "Johnny Bull" has not pretty essentially waked up to this matter within this period, that some of those Yankee specimens now to be seen in the great world's fair, will very much surprise him.

But how oddly these remarks sound to us, who are now so familiar with these really beautiful gems of the dental art.

In another part of his work, this same writer goes on to describe the process of staining artificial gums made of bone, ivory, and the teeth of the hippopotamus, by immersing them into a boiling solution of cochineal, red saunders wood, and vinegar.

These rude attempts at imitating nature's exquisite pencilings, although but the feeble beginnings of what we now see, yet, nevertheless, contain in them the hopeful prophecy of their glorious future, with respect to art, as applied to our profession.

While we take pleasure in awarding praise to those, who, in our own day, have achieved so much, candor and truth compel us to say that with respect to the formation and coloring of artificial gums, the goal is not yet reached. To a certain extent, one artist has copied another, when they should have been copying *nature most critically.* This, we think, must be obvious, where even the *best* specimens are placed in juxta-position with the natural gums of a healthy mouth.

In calling attention to this subject in this particular manner, we trust we shall not be accused, of the faintest desire to underrate, in the least, what has already been accomplished.

But if the moulding, or sculpture and painting of mineral teeth and gums, require the exercise of *so much* artistic skill, in order fitly and justly to represent the handy-work of nature, it is only a small part of what we deem essential to their successful use and application.

It is in their adjustment and adaptation to the mouth and

face, that real artistic skill and scientific attainments combined, are more essentially necessary.

The error is quite common, not only among dentists, but throughout the community generally, that *any individual* possessing a tolerable share of mechanical ingenuity, is competent to this business. But we think the absurdity and presumption of this thing will appear evident to every one who will attentively consider the following hints in their bearing upon this subject.

Every man has a *peculiar*, and in some respects a *distinctive*, physiognomy. And these peculiarities constitute the unerring marks of personal identity. That which makes the individual look like himself, and no one else. Now, no feature of the face can be changed or marred, either by accident or design, without imparting a different character to the physiognomy, and thus changing, to a certain extent, the relations of the individual. And hence the loss of an eye or the involuntary contraction of a muscle, or the paralysis of the nerve of any muscle of the face, so that its natural play is impeded, may be, and always are, considered most unfortunate in their effects upon the physiognomy. But by no means more so, than the loss or displacement of the dental organs. For here, the controlling influence of these organs are distinctly seen in all the physiognomical relations. The muscles of the cheeks, the moulding of the lips—the relation of the nose and chin—and that delightful play of the features, that indicates happiness and pleasure.

In every age of the world, the "human face divine" has been a subject of interesting study and observation, and to a certain extent, all men are physiognomists. Not that all men like *Lavater*, or the phreno-physiognomists of the present day, are scientifically learned upon the subject. But *instinctively*, and *practically*, they are, and ever will be so. From the little child that intently gazes upon your countenance, either to be won by its welcoming smile, or repulsed by its forbidden frown, to the man or woman of hoary hairs—all, are practical physiognomists. And it must, we think, be acknowledged, that any circumstance, or combination of circumstances, that

are capable of changing the whole expression of the face, and leaving upon the minds of our children and friends an impression so important and enduring as not to be disregarded or overlooked. It is of the teeth, and the features of the mouth, as related to physiognomy, that these remarks are to be applied.

It has not escaped the attention of close observers upon this subject, that every class of inferior animals, as well as distinct species of the human family, are characterized by the circumstances to which I have referred.

The researches of that great naturalist, Cuvier, has shown that the *teeth alone*, are sufficient to determine the class of animals to which they belong, although the fossil remains accompanying them, may be otherwise deficient. But why is this, if the teeth are not strikingly characteristic? The teeth of the carnivora are at once striking and peculiar. The gramnivorous and herbivorous, are also distinctly marked. Man, who, strictly speaking, belongs to neither class exclusively, yet partakes, to some extent, of the peculiarities of each, and may, therefore, be said to be omnivorous, is, nevertheless, sometimes characterized by a striking resemblance to some *one* of those distinct classes. Indeed, this is so manifest, in some instances, that these very circumstances will enable us to read the character of the individual possessing them, with as much certainty, and almost equal facility, that the Messrs. Fowlers can do it by the superfices of the cranium.

Who has not seen the distinctive marks of the *lion*, the *mastiff* and the *bull-dog*, in the mouth, teeth and lips of some men? And the cow, the monkey or the rat, as distinctly in others? And what difficulty have we in predicating certain traits of character peculiar to that class of animals, of these distinctive signs?

For illustration—suppose we find in the mouth of any patient, those sharp pointed teeth peculiar to the *carnivora*, so strongly marked as to excite our special attention—I ask, is there any risk in affirming of that individual, certain traits of character which are known to distinguish that class of animals? Of course, these peculiarities are variously modified according

to circumstances, but yet sufficiently marked for the purposes to which we refer.

But, if you will pardon this seeming digression, I would observe further, that those long, smooth, square-edged teeth, peculiar to the *kine*, or *herbivorous* class of animals, not only indicate a constitutional preference for a vegetable diet or regimen, but a docile temper, and tractable disposition.

These facts, (if such they are,) are certainly not without their value, not merely in a speculative, but in a physiological point of view. They certainly ought to be considered by the physician, whenever required to prescribe a rule of diet for any individual. And they seem to me to militate, with no inconsiderable force, against the exclusive notions of the so-called "*vegetarians*."

However interesting it might be to pursue this train of thought, it would make this paper far exceed its intended limits, if we should attempt its complete development. But we have called your attention to it, mainly to show its important relation to the subject, we have taken in hand. We shall generally find that these peculiarities, when strongly marked, influence, in a remarkable manner, the whole physiognomy. The nose and lips, as well as maxillary bones, receive a peculiar conformation adapted to the denture as it exists, or as it once existed. And where the law of sympathy is supposed to act, the relations between the several parts, must be established accordingly. Hence we find, short, square and generally strong and regular teeth, in short chubby, round-faced individuals. And so uniformly is this the case, that it ought never to be overlooked, or disregarded by the dentist, whose duty it may be to supply an artificial denture. We should not be willing to assert, that the tallest persons in community, *invariably* have the longest teeth. But we do say, that, *ceterus parabus*, this is generally the case. It is sometimes, true, that very tall persons have very short faces, and small heads. They may be, in some instances, it is true, like certain tenements which you have seen, in this particular—"long between joints and low in the garret." In a case like this, you will doubtless find a great disproportion

in the length of the teeth, as compared to the body and limbs. But these may be considered rather as exceptions to the rule, than as constituting the rule itself.

Nature is generally harmonious in matters of this kind, and seldom places a short trunk and diminutive head upon long, slim pedestals. And the relative size of the body, its peculiar conformation, and other circumstances, may be told with as much precision and exactness from seeing the teeth alone, as it is possible to infer the same from any other detached portion. The law of relative proportion is such, that these circumstances seem to us indubitable.*

Now, if these considerations are entitled to any weight, as

* The following extract from a recent scientific work, is so full of interest, and so much to the point under consideration, that I trust I shall be justified in quoting it here. It is as follows:

"In the extensive quarries of gypsum, near Paris, the workmen frequently dug out the bones of unknown animals. In the mind of the uneducated laborer, they excited little attention, and were thrown away. The fact, however, coming to the knowledge of Cuvier, he undertook to examine the matter. The result of the examination astonished himself and the world. He discovered upwards of fifty species of animals, not now known on earth. They all belonged to the order which naturalists call the *pachydermata*, or thick skinned, of which the horse, the hog and the rhinoceros, are examples. They were not, however, the horses, hogs, or any thing else now living on the globe."

Cuvier's own account of the manner in which he succeeded in reconstructing these strange skeletons, is peculiarly interesting.

"I found myself, says he, as if placed in an immense charnel-house, surrounded by mutilated fragments of many hundred skeletons, of more than fifty kinds of animals, piled confusedly around me. The task assigned me was to restore them all to their original position. At the voice of comparative anatomy, every bone and fragment of bone, resumed its place. I cannot find words to express the pleasure I experienced in seeing, as I discovered one character, how all the consequences which I had predicted from it, were confirmed. *The feet were found in accordance with the characters announced by the teeth; the teeth in harmony with those indicated beforehand, by the feet;* the bones of the legs and thighs, and every portion of the extremities were found set together precisely as I had arranged them, before my conjectures were verified by the discovery of the parts entire. In short, each species was, as it were, reconstructed from *a single one* of its component elements."

tending to throw light upon the uniformity, consistency and harmony of nature's own works, their pertinency to the subject before us, must be seen at once. And something more than mere mechanical skill is required in preparing and adjusting artificial teeth.

If it be true, that the size, shape, color and position of the teeth in man, conveys to the mind of the beholder certain distinct impressions as to *character* and *temperament*, then it is easy to be understood, how the dentist may *libel a man, and destroy his character completely.*

If he puts in the mouth of a broad shouldered, thick necked, chubby laughing faced individual, an entire set of long, slender and delicately transparent or pearly teeth, he has outraged nature, in her own temple, and caricatured his confiding victim. Such teeth as these, do not belong to this variety of the species any more than the teeth of an insignificant poodle belongs to a mastiff, or a brave Newfoundland dog. And the varieties in the former, are as remarkable as in the latter case. Equally unbecoming and improper would it be, to substitute large, short, yellow teeth, in the mouth of a delicate young lady of a nervo-sanguine temperament, blue eyes, clear complexion, and a pulmonary diathésis.

Age, too, has its distinctive marks. Not that we are to examine the mouths of men and women as they do horses, to learn how old they are, not so. But, I contend, that the operator should be able to tell, from the numerous physical signs connected with this subject, the relative size, color and form of the teeth associated with the several varieties of temperament, form, figure and age, of each individual. In old age, the complexion changes, becoming more sallow, and less transparent. And the same change as to color takes place in the teeth of aged persons.

The diminished force of the heart and arteries, the consequent moderation in the action of the capillary vessels, together with the corrugated, or wrinkled, condition of the skin in the case of aged persons, all tend to corroborate this statement, and may be regarded as so many signs hung out for our guidance in the pursuit of scientific knowledge.

The antagonism of the teeth, is another point demanding our attention. Every one knows the effect upon the physiognomy, which that peculiar protrusion of the under jaw, known as "*jimber-jaw*" produces. The style of the countenance, and the "*tout ensemble*" of the face, becomes identified with this malformation, and receives its peculiar physiognomical character from it. And every similar departure from a legitimate and regular arrangement of the features, is, in so far, a departure from the true standard of personal beauty.

In the arrangement of an artificial denture, as to the matter of antagonism, much of personal beauty and individual character depends. And, I might also add, much of the comfort and real utility of the teeth themselves. How much annoyance, vexation and weariness people are sometimes compelled to endure, in consequence of a false antagonism of the teeth, may be known, by attending to the following circumstances.

In the first place, nature has fixed the precise point of contact between these organs, and has adjusted the muscular movements of the parts accordingly. And it must be obvious, that any alteration, involving a change in the leverage of the parts, must subject the muscles to a strain, involving weariness and pain. And not only so, but every motion of the parts, either in eating or speaking, must be accommodated to the change. This necessarily involves a comparative change in the arrangement of the features, and an expression of the countenance, at once unfortunate and unnatural.

To adjust these parts in harmony with nature's own plan, so as to preserve the just balance of power, the easy and natural motion of the parts, and the regular and uniform play of the features, is absolutely indispensable to success, and is, therefore, most desirable. Moreover, any variation from this point, even though it be but the twelfth or sixteenth part of an inch, necessarily changes the fulcrum, and diminishes the power and ease with which mastication is performed. I have become satisfied from observation upon this point, that too little attention has been given to these considerations by the members of our profession. And it has doubtless been observed by you all, in the course of

your experience, that the teeth artificially supplied, are sometimes too short, and sometimes too long—and thus, in both instances, imparting a false character to the person who wears them. And it is only by attending to some of the suggestions herein made, that a remedy can be supplied. A perfect imitation of nature, is the perfection of art.

The very best productions of the greatest masters, in painting and statuary, always have, and ever must, derive their greatest excellence from the fidelity and skill with which they can copy nature. Aside from this, neither painting nor sculpture possess any excellence, or are of any value. And this resemblance, which is so essential in works of this kind, necessarily involve the strictest attention and deepest thought. Circumstances are of consequence to them, which, to men in other professions, are of little account.

And the same thing is true of him who would distinguish himself in the department of dental surgery, to which we refer. The form, figure, size, temperament and complexion, are all to be consulted, and order and harmony restored. Where malformations and actual deformity exist, real artistic dentistry may do much in changing and bringing back, the legitimate form and expression of the face. Indeed, it must be in circumstances like these, that the most noble and splendid achievements are to be sought. And the restive spirit of professional ambition can never be satisfied until the results, so briefly alluded to, and so imperfectly foreshadowed, are fully realized.

ARTICLE III.

Experiments on the Electro-Galvanic Process for Depositing Plates for Artificial Teeth. Read before the American Society of Dental Surgeons, at their Twelfth Annual Meeting, held in Philadelphia, Aug. 5, 6 *and* 7, 1851. By A. Hill, D. D. S.

Gentlemen of the American Society:

Agreeably with the request which you were pleased to make, at the last annual meeting of this society, I herewith submit to you the results of some of my experiments in electro-plating; or rather, in depositing plates for mounting artificial teeth by the electro-type process.

Some eight or nine years ago, I conceived the possibility of depositing metallic plates, upon plaster or metallic models of the mouth for dental purposes. But being ignorant of the process, I did not attempt a practical solution of the matter at that time. Shortly subsequent, however, I called on some scientific gentlemen, in the city of New York, who I supposed to be well acquainted with the electro-type process, and on inquiry satisfied myself that the thing was not sufficiently developed to warrant a trial. And as from the best sources of information within my reach, there appeared to be no probability of success, the matter was deferred until an opportunity might occur for experiment.

About two years since, I became acquainted with a gentleman who was practically engaged in the electro-plating business, and it occurred to me, that here was a chance for experiment. I accordingly laid the whole matter before him, and obtained a favorable opinion as to the success of the undertaking. We immediately commenced our experiments, the results of which I now proceed to detail.

The first thing in order was to prepare my models. This was done in the ordinary way, with calcined plaster of paris, with a small copper wire to serve as a connection with the battery, running diagonally through the model, with the end

slightly projecting in the palatine arch. This done, the next thing was to render the plaster model a non-absorbent.

For this purpose, after trying various experiments, I found that a solution of gun cotton in sulphuric ether, answered the best purpose. Copal, and other varnishes, although answering a tolerable purpose, we found would not stand the strong action of the alkaline solutions when immersed in them. But the gun cotton solution, commonly known as "liquid cuticle" was sufficient for this purpose.

After this was spread entirely over the model, with a brush, and suffered to become perfectly dry, the next thing was to make a conducting surface. Here, the greatest difficulty presented itself. Plumbago, which is ordinarily used, or rather recommended, for such purposes, we found would not answer. Various experiments were resorted to, to accomplish this object. The following, however, was most successful. After drawing a line with a pencil, around such parts of the model as we wished to have covered with the plate, we took a small camel's hair pencil brush, and laid over a thin coating of sizing, then upon the sizing, we would lay on gold or silver foil. This process requires much care, inasmuch as any imperfection or blemish is certain to be copied in the deposition, or plate. This was allowed to dry, after which, it was ready for the battery.

Instead of the foil thus applied, we sometimes used bronze, which answered a good purpose, especially where copper is to be deposited. Much care and practical experience is requisite to make a firm, solid and tenacious plate. The power of the battery must be delicately graduated, or the deposit will be rough and coarsely granulated. A gentle movement of the solution is also requisite, in order that the deposit may be uniform and even. After the plate had acquired sufficient strength and thickness, it was removed from the model, thoroughly cleansed, and then immersed, so as to receive a deposition on both sides. In this way a sufficient thickness may soon be obtained. Frequent removal and scouring is necessary to prevent an irregular granulation.

In this way, I have succeeded in forming several plates, of

sufficient thickness and strength to be worn in the mouth; some of which I had the pleasure to exhibit before this society, at its last annual meeting. For the sake of economy, my experiments were made with silver and copper. I found that copper could be deposited with the greatest facility of either of the metals, upon plaster. I, therefore, conceived the idea, that copper might be used as a basis for the other metals, affording strength while it would likewise lessen the expense. I, therefore, took an impression of a lady's mouth, for an entire set of teeth. Made a deposit of copper, as above described, then cleaned the plate, and deposited a coat of pure silver over its entire surface; upon this, I mounted the teeth, using soft solder to secure them to the plate, after which they were again immersed in the battery, and received another coating of pure silver.

The fit was most perfect, and my patient delighted. By the way, I should mention, that this lady was the wife of the gentleman with whom I was experimenting, and of course knew the nature of our experiments. Here, then, I had high hopes of success. But a circumstance developed itself which soon taught us another lesson. In wearing this plate, a galvanic action took place, which seemed fatal to this particular feature of our enterprise.

But, I have become well satisfied by much reflection, that if this process is conducted in a perfect manner, no galvanic action can result. And for this very good and sufficient reason, viz. that where the copper is perfectly covered and protected from fluids by the silver, no such action can take place, as it is essential that the fluids of the mouth act upon both metals, in order to produce it.

This plate, mounted with teeth—the first in all probability ever worn—has now been used more than a year, although fresh deposits of silver have been from time to time made upon it, as I understand.

The use of copper (if it can be used in this way) will overcome, and obviate several difficulties.

1st. It can be deposited with greater facility, and therefore shortens the time of the process.

2nd. It diminishes the expense, and

3dly. It can be annealed without danger of warping, or blistering. And finally, if you add a coat of pure gold to the whole piece, I cannot imagine any harm that can come of it.

During the past year, circumstances have transpired which rendered it extremely inconvenient for me to pursue these experiments. And I regret exceedingly, that I am obliged to report so little progress in this very interesting department.

That plates can be deposited in this way, ensuring a more perfect adaptation to the mouth, while at the same time it relieves the profession of the entire process of swaging, I have already demonstrated. That it can be done with sufficient facility and economy to supersede the old method, remains to be seen. I cannot but regard the experiment as a fine field for instructive and useful study, and worthy the attention of every member of the dental profession.

I am of opinion, that models made of D'Aartes' mineral, or fusible metal, may be used instead of plaster, and thus obviate the difficulties of forming a connecting surface with that material.

When models of this metal are used, and a sufficient body of the plate deposited, the model, or casting, may be melted away, leaving the plate unharmed, annealing it at the same time.

I cannot doubt that the time will come, and that too, before long, when, in our large cities, the dentists will have nothing to do towards preparing a plate, but to make his casting, and draw around it the line for the borders of his plates, and leave it with the electro-platers.

It would be entirely superfluous and unnecessary for me here to enter upon a labored description of the ultimate advantages of this process, if once rendered practicable. They are so obvious as to suggest themselves to every reflecting member of our profession; and so great as to inspire fresh hopes of advantage in every case.

The metals deposited in this way, must necessarily be *pure.* An entire gold plate, therefore, could not be used to advantage,

as pure gold is too soft. But pure gold may be deposited upon pure silver, of sufficient thickness to answer every purpose, and at the same time, be less objectionable than the ordinary rolled plate, now in use, as to any galvanic, or corrosive action in the mouth. It should be remembered, that all metals deposited by this process, require annealing, as they come from the battery hard and exceeding brittle.

In conclusion, gentlemen, allow me to express the hope, that this subject may be taken up by some member of the profession more competent than myself, and prosecuted to a successful termination; and if I can impart any hint or item of information that will contribute to this result, it will give me pleasure so to do.

ARTICLE IV.

An Essay on Professional Empiricism. Read before the American Society of Dental Surgeons, at their Twelfth Annual Meeting, held in Philadelphia, August 5th, 1851. By A. C. HAWES, D. D. S.

CONNECTED with almost every kind of honest business with which I am acquainted, are to be found some improper and dishonest practices, which arise too often from the minds of money-grasping, vicious men, engaged therein, whose aim is neither the advancement of science or art, nor the elevation of the calling which they have chosen to pursue; but rather the accumulation of the profits arising therefrom, however they may be obtained.

These practices, as applied to distinct occupation have been called—so long that "the memory of man runneth not to the contrary"—"the tricks of the trade." But, in these latter days, they are more properly defined by the general term "*Humbug.*"

I have been invited to prepare a short "Essay" upon some

subject connected with the "theory or practice of dentistry," and, I trust, no member of this association will be offended that I have thus early in my effort, arrived at the word "humbug." I hope I shall be pardoned, but I really do not know any subject more positively connected with the "*practice*" of our profession (and I regret to say, sometimes, more profitably) than this modern word, which contains so much disgraceful meaning. Of the "*theory*" I do not design so particularly to speak.

It is said to have been a maxim once taught by a dishonest father to his son—"Get *money!* get it *honestly*, if you can, but get it." And we now and then find a member of our dental faculty, whom to judge from his professional conduct, we might safely suppose to be the veritable son who had taken his father's maxim as law, and felt bound to abide by it.

We witness these professional impositions in the reprehensible want of candor exhibited towards those who patronise such dentists as I have alluded to, in the inclination to deceive them in regard to the condition of their teeth; and the nature of the operation which may so particularly effect their comfort for all coming time. In the lack of sympathy shown to the patient, and the willingness of the operator to forget his comfort; as well as in the absolute recklessness which he manifests for the character of his profession; for, in his eager grasp for the "almighty dollar," he loses sight entirely of the fact, that something is due to the profession and its character. He seems to forget, in view of this corrupting talisman, that he is dealing with flesh and blood, and that the delicate organs which he operates upon, contain nerves and blood-vessels, which render them so extremely sensitive as to require all the skill and care which can possibly be bestowed to prevent the most excruciating pain.

He considers the whole operation a mere business transaction, and comforts himself by thinking that there is no money to be made by entertaining sympathy for the suffering patient.

By such practitioners, the patients are received with an air of kindness, which is, of course, pleasing to them, and while suffering, perhaps, under the pain of a raging tooth, or their

minds are filled with a fearful anxiety in relation to the amount of suffering they are to endure in the process of the operation, they are prepared to believe any thing which the dentist may tell them, however absurd. And the frank and open, only in his manner, is prepared to tell them any thing which will tend to swell his profits, though the patient suffer under or by the operation ever so much. If a question is asked, the answer of the dentist is such as would be likely to secure the job; his object being not to tell the truth—not the establishment of a character—not the elevation of his professsion, but to "get money."

If, for instance, a lady, under a mistaken idea of the manner of performing an operation, and ignorant of the technicalities of the profession, ask him if he will insert a single tooth on the "principle of atmospheric pressure," he readily replies—"Oh, certainly, if you wish it; that is a very common way for *good* dentists to insert single teeth. It is a little more expensive, to be sure; but when you want a single tooth *well* set, it should always be on the principle of "atmospheric pressure." There are very few dentists who *can* insert them upon that principle—though, *I* have had much practice in that way; and you will find it better, by all means, when you have teeth inserted, to have them fastened in that manner." When the operation is completed, he informs his fair "patient," that he has added a little more expense, by fastening a couple of clasps upon each end of the plate, just to *steady* the tooth.

It then being *secured* in the lady's mouth, he takes his pay, for the single tooth, the "atmospheric pressure," and the "four clasps," with a manner of exceeding honesty, and as a parting favor he gives her the gratuitous information, that when the *air* is exhausted, she will perceive that the tooth adheres to the gum most delightfully, and adds, as a parting word, "but, madam, if any thing should happen to *that* tooth, be sure and consult *me*." The lady retires well pleased that she has been through the "atmospheric pressure" operation—with four springs on the plate, with so little pain, and she is delighted with the seeming candor, urbanity and honest bearing of the operator, and is well satisfied to have paid the triple price of his impositions, and the man smiles at his own impudence.

It is true, that such a man cannot long impose on the same person, in this more than any other calling in life; for the time comes when the patient learns, that there is more "*suction*" in the "atmospheric pressure" principle of such a dentist, than is at first bargained for. He is, in short, one of those whom Shakspeare has described as "one who will steal into a man's favor, and for a week escape a great deal of discovery, but when you find him out you have him ever after."

Dr. Berry, of Newport, once informed me that a lady one day called on him, who had had a tooth inserted on the root of another, and desired him to insert a second in the same manner, asserting that it had been in for nearly a year and that she had never had the slightest trouble with it, for the reason that it was fastened by suction.

The doctor examined the tooth, (perhaps rather more minutely than prudence would have dictated,) for the purpose of ascertaining the modus operandi of his professional predecessor; but while prying into (what, for aught we know was) the air chamber, the tooth came out, when lo! the discovery was made, that the suction lay in a large *iron* pivot, which had become nearly rusted off.

Such practices as these I have reason to think are resorted to by many who have adopted our profession, but such a course I know, must be condemned by the great body of our dentists. Those who are really skilful, have no need to resort to deceptions like these, and those who are unskilful, will much sooner arrive at a respectable standing among their brethren, by seeking to improve. If the gain of gold is the only object for malpractice with these wicked cheats, there is nothing which will so surely keep one from the goal of his desires. It certainly cannot be wrong to deal honestly, and it is something more than dishonest, it savors much of cruelty to deceive those who, not only confide in our word, and who, suffering with agony, in all confidence place themselves in our hands, to endure a still greater amount of real or imaginary torture. When or where do we see more intense agony than we observe depicted in the countenance of a timid person when about to submit to

some dental operation, however simple. When anticipated pain like an electric shock, seems to dart through every fibre of the delicate frame, and "cold fearful drops stand on the trembling flesh."

I have seen patients laboring under such a weight of painful excitement, when only awaiting the extraction of a tooth, that if instead of a tooth, life itself were about to be parted with, they scarce could suffer more. And surely this is no time for deception—this is not the occasion on which to practice the "tricks of trade." This is the moment in which the dentist is looked to with the utmost confidence, and this is when he is called upon to exhibit, not only truthfulness, but sympathy, to speak a word of encouragement, to allay the (perhaps needless yet still oppressive) fears. And to my mind it is as much a part of the duty of a dentist to prepare the *mind* of the patient for an operation, as it is to perform that operation in a faithful manner.

The dental art is but in its infancy. Each succeeding year brings to light new discoveries and important improvements. And the experience of every day shows us that the business of the skilful dentist is more and more appreciated. Then away with all deceptions, all tricks, all "humbugs." Let industry and honest emulation among our members be the means to excellence; let our aim be, not so much to get rich, as to raise a standard of honorable character for our profession, and for ourselves. Industry, integrity and a constant aim at perfection in our art, will bring to us wealth and character, the praise of men, and the approving smile of heaven.

ARTICLE V.

Report on American Dental Literature. Read before the American Society of Dental Surgeons at their Twelfth Annual Meeting, held in Philadelphia, 5*th,* 6*th and* 7*th of August,* 1851. By Robert Arthur, D. D. S.

The undersigned was appointed at the meeting of this association, held in Baltimore, in March, 1850, to furnish a report on Dental Literature.

It is known to most of the members present, that this committee, consisting originally of three members, was formed at the annual meeting of 1849. In addition to the special duty of making a report on dental literature, the committee was required to take up also the subject of dental education.

Upon consultation, two difficulties occurred to the members of that committee: they could not but believe that the duties assigned it were more than it could profitably attend to, and there was doubt as to what the society desired in the way of a report on dental literature. For these reasons, nothing was done until the meeting above alluded to was called.

It was then, after some discussion, decided that the committee on dental literature should be exclusive of any other subject, and that its duties should be confined to an examination of American dental literature. For reasons stated at length, at the time, this restriction did not meet the views of the undersigned, and although he consented to perform the duty assigned him by your favor, it was with reluctance, and subsequent regret.

In addition to this restriction, the impression made upon the undersigned from the tenor of the discussion which occurred at the time, was, that the society desired nothing more than a brief descriptive catalogue of such works upon Dental Surgery as were the production of American authors.

Governed by these impressions, the undersigned, your committee, engaged in the examination of such works as came within his reach. These were courteously furnished from the library of professor C. A. Harris, and embrace nearly every thing upon the subject, which has appeared in this country.

The first work published in this country, the first at least within the knowledge of the undersigned, is mentioned in a catalogue at the close of Fitch's Dental Surgery. It is by S. Renners, and was published in 1801. Your committee has not been able to procure a copy.

The first work in the hands of the undersigned bears the following title:

A Treatise on Dentistry. Explaining the Diseases of the Teeth and Gums, with the most effectual means of Prevention and Remedy; to which is added Dentition, or Rules to be observed during that Interesting Period. By B. T. Longbothom, Surgeon Dentist. 12mo, pp. 68. Baltimore, 1802:

This is a popular treatise, and the author disclaims any intention of endeavoring to make dentists by means of the contents of his little book, regarding the acquirements necessary to constitute a thorough dentist, such as to make it obligatory upon him to study anatomy, and the general principles of medicine.

With a good deal that is fantastical and erroneous, this little work contains no little which is worthy of note, and some of his practice is very much in accordance with that of the present day.

He proposes the cure of alveolar abscess by laying it open to the bottom, and keeping it open by means of lint dipped in tincture of myrrh, or some stimulating balsam.

For abscesses of the antrum, he preferred making an opening into this cavity through the socket of the canine tooth.

He advises the use of a compress for arresting excessive hemorrhage, after the extraction of teeth, very much in the way it is now applied.

He recommends filling the roots of teeth, when, from any cause it is not thought advisable to extract them.

He mentions having seen sets of teeth retained in the mouth by atmospheric pressure. This method of inserting artificial teeth has been claimed to be of more recent origin. It has been seen, however, by the readers of the American Journal of Dental Science, that the elder Gardette, of Philadelphia, acci-

dentally fell upon this plan of inserting complete sets of teeth, as early as 1800.

Between this little work and the next which was published upon the subject, so far as has come within the knowledge of your committee, there was a long interval. In 1819 was published:

A Practical Guide to the Management of Teeth. Comprising a Discovery of the Origin of Caries, or Decay of the Teeth, with its Prevention and Cure. By L. S. Parmly, Dental Professor. 12mo, pp. 198; Philadelphia, 1819:

This, also, is a treatise intended for the public. The author, as the title indicates, advances, what at the time of this publication, was a new theory of the causes of dental caries, which he claims as his own discovery. He attributes caries "to the relics of what we eat or drink, (without regard to quality,) being allowed to accumulate, stagnate and putrefy either in the interstices of the teeth, as is most commonly the case, or else in the indentures on their surfaces, favorable for the lodgment of food."

Lectures on the Natural History and Management of the Teeth; the Cause of their Decay; the Art of Preventing its Accession, and the Various Operations, never Hitherto Suggested, for the Preservation of Diseased Teeth. By L. S. Parmly, Dentist. 8vo, pp. 108. New York, 1821. Second Edition.

This work, by the same author, comprises three lectures, purporting to have been delivered at the Franklin House, Broadway, New York. The subject is treated generally for the benefit of the public, as in the work above noticed.

An Essay on the Disorders and Treatment of the Teeth. By Eleazar Parmly, Dentist. Third edition, 12mo, pp. 88. New York, 1822:

This is also a popular treatise. In its general arrangement it is divided into three parts:

1st, The Growth of the Teeth.

2d, The Diseases of the Teeth.

3d, Operations on the Teeth.

The broad proposition is here laid down, that decay of the

teeth is universally caused by the action of external agents; and Dr. P. states, that the teeth are predisposed to caries in consequence of their sometimes being of less dense structure, and less capable of resisting the action of the decomposing matter.

The Family Dentist. Containing a Brief Description of the Structure, Formation and Diseases of the Human Teeth. By Josiah F. Flagg, M. D., M. S. S., Surgeon Dentist, 12mo, pp. 82. Boston:

This is a popular treatise on the teeth, the object and scope of which are set forth in the advertisement with which it opens, viz.

"1. To give, in as few words as possible, a clear description of the structure and formation of the teeth, and to bring to view those circumstances connected with their growth, with which it is important for every individual to be acquainted.

"2. To give a brief sketch of the most common diseases to which they are liable, together with such directions relative to their treatment and preservation as shall enable the reader to take the necessary care of his own teeth; and of a parent to pay proper attention to the teeth of his children.

"3. To guard against the injurious practice of ignorant operators; and to remove some of those popular prejudices which prevent many from adopting the only mode of treatment calculated to diminish the liability to disease of these useful and important organs."

On the Teething of Infants, and the Complaints to which it may Give Rise. By J. Trenor, M. D., Dentist:

This article appeared in the New York "Journal of Medical and Physical Science," in 1823. Dr. T. denies the truth of the position, that the irritation of teething is caused by the reflex pressure of the forming tooth upon the delicate membranes in consequence of the resistance offered by the gum, and attributes it to the irritation of the mucous membrane of the gum, caused by contact with the enamel, which, devoid as it is of vitality, acts as a foreign body.

Treatise on the Structure, Diseases and Management of the

Human Teeth. By Eleazar Gidney, Dentist, 12mo, pp. 124. Utica, 1824:

This is a rather more extended treatise than any which was published up to this time.' It displays evidences of observation and careful reflection upon the subjects of which it treats.

The author contends, that caries of the teeth is produced by internal, as well as external, causes; but gives preponderance to the latter. He says, that the nerve may be deprived of vitality by extremes of heat or cold acting upon the external surface of the sound tooth, and that it will then suppurate and make its way through the substance of the dentine.

This is not simply a popular treatise, but goes into the subject in sufficient detail to have deserved the attention of the practitioner of the day when it was published.

A Physiological Inquiry into the Structure, Organization and Nourishment of the Human Teeth. By J. Trenor, M. D., Dentist, 8vo, pp. 25. New York, 1828:

Dr. T., in this carefully considered and well written paper, denies that the teeth possess that high degree of organization now generally ascribed to them; and although he does not regard them as entirely devoid of vitality, places them lowest amongst the organized tissues. He attributes no other office to the pulp than that of depositing upon its surface layer after layer of bone, by exudation, similar to the process by which the shells of the crustacæa are formed, until it is, eventually, entirely extirpated. The nourishment of the teeth is entirely due, in his estimation, to the peridental membrane, and he regards the extirpation of the pulp as productive of no injury to the tooth, and strongly advocates the practice. Dr. T. mentions, in this paper, that Dr. Hudson, of Philadelphia, introduced this practice many years before, and declares his own knowledge of innumerable cases of this kind, treated by Dr. H. ten, fifteen and twenty years before, which, at the time he wrote, were in a perfect state of preservation, and in every way as useful as any other teeth.

This is a very interesting paper, and well worthy the attention of every student of dental surgery; and, although I am

not prepared to agree with the positions taken by Dr. T., I cannot but regard his paper as a clear, carefully considered and plausible argument.

Observations on Neuralgia, with Cases. By J. Trenor, M. D., Dentist, of New York. 8vo, pp. 28:

This paper has no date, but was, evidently, published about the time of that last noticed.

Dr. T. takes the ground, that neuralgia is caused by inflammation of dense structure, in which, as somewhat in odontalgia, the nerves having no room for exhaustion give rise to those extremely painful symptoms which mark this complaint. In accordance with this view of the pathology of the disease, his treatment consists in freely laying open the affected part with the lancet. Although the pain is felt over a considerable region, it may generally be traced to some part very circumscribed in extent. He gives three cases in which the trouble seemed to be caused by the teeth, which, however, were quite healthy; relief was obtained by discovering the spot from which the affection seemed to take origin, and freely laying it open. In these cases the incisions were made inside the mouth, which he advises to be done when it is feasible, in order to avoid leaving a scar in a visible part.

Whether these views are correct or not, it is impossible to read this essay without being impressed with the absolute necessity that the competent practitioner of dental surgery should have a general knowledge of medicine. In one or two of the cases here mentioned, the individuals who were subjects of the disease had been under medical treatment, and were sent to Dr. T. under the supposition that the trouble was caused by a diseased condition of the teeth. Although perfectly healthy, the pain in these cases seemed, by very marked symptoms, so clearly to proceed from the teeth, that the conclusion of every one who had not carefully considered such cases, would probably have led to the sacrifice of important teeth, without affording more than temporary relief.

The first systematic treatise published in this country, intended exclusively for the instruction of those who adopted

dental surgery as a profession, appeared in 1829. I have not met with a copy of the first edition, and from the second edition now in my hands, I give the title—

A System of Dental Surgery. In Three Parts. I. Dental Surgery as a Science. II. Operative Dental Surgery. III. Pharmacy connected with Dental Surgery. By Samuel Shelden Fitch, M. D., Surgeon Dentist. 8vo, pp. 551. Philadelphia, 1835:

This work is principally a compilation as avowed by the author, in his preface to the first edition, and may be regarded as a *resume* of every thing of value which had been written upon the subject of dental surgery, up to the time of its publication. Some of the writers from whom the materials for the work were drawn, are mentioned by the author. It will be seen that he has availed himself of the labors of the most distinguished writers, upon the subject of which his work treats.

"From the French. Martin, Fouchard, Bourdet, Jourdain, Duval, La Forgue, Delabarre, Le Maire, Baumes, Audibran, Rousseau, &c. &c.

"Latin. Baglivi, Bartholini, and others.

"English. Hunter, Blake, Fox, Murphy, Parmly, Kœcker, Darwin, Rush, Chapman, Horner, Coates, &c. &c."

This work, however, is doubtless quite as familiar to all the members of this association as to your committee, and it would subserve no useful purpose to offer an abstract of it.

Remarks on the Importance of the Teeth, on the Diseases of the Teeth and Gums and on the Diseases produced by Diseased Teeth with their Modes of Cure; and Directions for forming Regular and Beautiful Sets of Teeth, and for the Preservation of their Health and Beauty. 8vo, pp. 13. By Francis B. Chewnurg, Dentist, Richmond, Va. 1833:

This is a popular treatise. The title is sufficiently descriptive of its contents.

The Family Dentist, or a Familiar Treatise on the Art of Securing a Beautiful Set of Teeth. By Dr. Homer Bostwick, Dentist. 12mo, pp. 100. New York, 1835:

Besides others, mention is made in this popular treatise of

works on the teeth by Pleasants and White, copies of which have not come into the hands of your committee. Allusion is also made to,

Dentologia; A Poem in Five Cantos. By Solyman Brown, A. M., with Notes by E. Parmly:

This production was subsequently republished in the Library part of the Journal.

An Inaugural Dissertation on the Physiology and Diseases of the Teeth, Submitted to the College of Physicians and Surgeons of New York, and Publicly Defended, for the Degree of Doctor of Medicine, April 6th, 1835. By Shearjashub Spooner, Member of the Montreal Medical Society, 8vo, pp. 32, New York, 1835.

Observations Generales sur l'Importance des Dents. Par A. L. Plough, Chirurgien Dentiste a la Nouvelle Orleans, 8vo, pp. 8, New Orleans, 1836:

This is an appeal to those having charge of young persons upon the great importance of giving attention to their teeth. The author states, among other things, this deplorable fact, that in visiting the best schools, he had taken occasion to examine the mouths of the pupils, and nearly always found them in most wretched condition, no attention having apparently been paid to their cleanliness. He further states, that he found seventy out of every hundred with diseased teeth, gums affected and breath fetid.

Guide to Sound Teeth, or a Popular Treatise on the Teeth. Illustrating the whole Judicious Management of these Organs from Infancy to Old Age; in which the Author will attempt to show that the Teeth of all Persons, which are constitutionally well formed, and who enjoy good Health, may, by proper Management and Care, be Preserved to the end of Life. By Shearjashub Spooner, M. D., pp. 208, New York, 1836:

This is the most systematic and elaborate popular treatise which had been published up to the time of its appearance. It goes into the subject at large, in full detail, with the object of placing in the hands of every one such a knowledge of the growth, structure and diseases of the teeth, as will enable him

to understand the causes which produce diseases of the teeth, and be able to make use of the best means of avoiding them.

In this work, Dr. Spooner first made public the fact that arsenious acid would destroy the vitality of the dental pulp.

A Public Treatise upon the Preservation of the Teeth, comprising the most Useful Rules for Securing their Whiteness and Beauty, with Observations on the Cause and Prevention and Cure of Caries, and their Effect upon the Health; Intended for Families and the Public Generally. By M. Overfield, pp. 80. Winchester, 1838.

Dental Hygeia. A Poem on the Health and Preservation of the Teeth. By Solyman Brown, A. M., Author of Dentologia, &c., with notes, pp. 54. New York, 1838.

Popular Information on the Subject of Dentistry. By George E. Hawes, and Charles C. Allen, M. D. Dentists. 12mo, pp. 12. New York, 1838.

Observations on the Structure, Physiology, Anatomy and Diseases of the Teeth. In two parts. Part I. By Harvey Burdell, M. D., Honorary Member of the Philadelphia Medical Society, and Member of the Medical Society of the City and County of New York. Part II. By John Burdell, Dentist, with Drawings and Illustrations. 8vo. pp. 96. New York, 1838.

The Dental Art. A Practical Treatise on Dental Surgery. By Chapin A. Harris, M. D., Surgeon Dentist. 8vo, pp. 377. Baltimore, 1839.

This is the first edition of a work which is now so well known to every member of this association, that any abstract of its contents would be a work of supererogation. It was the first entirely original work published in this country for the use of the profession exclusively, and still, after having reached a fourth edition, stands alone. Dr. H. has devoted himself to this work with remarkable energy and industry, and certainly deserves the thanks and regard of the profession for what he has done.

It is just as well here to follow this work through its course. It was first published in a series of numbers, a short time previously to being put into book form, in a weekly literary

periodical, published in Baltimore, called the "Monument."* It was then issued, after having been considerably modified by the author, in its present form.

In 1845 a second edition appeared, but so much changed indeed, as to render it almost a new work. The title was then changed to that which it bears at present, viz. "Principles and Practice of Dental Surgery," and was enlarged so as to form a volume of six hundred pages. It was also profusely illustrated. The work in this form was generally acknowledged to be the best practical treatise on Dental Surgery, which had ever appeared in any language, and the edition was soon exhausted.

In 1848, a third edition appeared, it was so much increased in size as to contain seven hundred and fifty pages.

In 1850, the fourth edition now before the profession, was published. Considerable changes, improvements and additions, were made in this edition, which comprises some eight hundred pages.

On the first of June, 1839, was issued a specimen number of the "American Journal of Dental Science." The circular of the publishing committee, E. Parmly, E. Baker, and Solyman Brown, sent it forth with many apparent misgivings as to the success of the experiment, and appealed in strong terms to the more intelligent members of the profession, to come forward to its support. The object in commencing this publication, was to afford, through its means, a vehicle for useful information to the numerous practicing dentists in the United States. The Journal was to consist of forty-eight pages, twenty-four of which, were to be devoted to the republication of standard works on dental theory and practice. It was to be issued monthly.

The need of such a publication was evinced by the promptness with which this effort was encouraged. In the fourth number a list of subscribers, embracing the most eminent names in the profession, was published, showing that there were at that time, one hundred and seventy-four subscribers taking five hundred and eleven copies. This may seem a

*There were only some 30 or 40 pages of the work it published, previously to its appearance in book form. *Eds. Jour.*

small number, but when it is recollected, that this was twelve years ago, when the number of intelligent reading dental surgeons was very small, it must be regarded as evidence of a remarkable general interest in the undertaking.

During the first year of its publication the Journal was conducted under the editorial charge of E. Parmly, of New York, and C. A. Harris, of Baltimore, in which city it was printed. It was issued, with some irregularity, in monthly numbers, at the subscription price of three dollars per annum. At the close of the year it came into possession of this Association, which at that time was organised.

The title was changed to that of the "American Journal and Library of Dental Science;" it was to be issued quarterly instead of monthly, as before, and the subscription price was increased to five dollars. It was placed by the society in the charge of C. A. Harris, of Baltimore, and Solyman Brown, of New York. The editors were to be assisted in their labors by twenty collaborators, whose duty it was to furnish matter for the work and to aid in its circulation.

From that period to August, 1850, the Journal continued to be issued under the auspices of the society, under the charge of several editors, appointed yearly, by the society. At the annual meeting of the association in 1850, it was transferred to Dr. C. A. Harris, of Baltimore, the society relinquishing all control of the Journal, which is now a private enterprise.

The publication of the Journal, is, in the opinion of your Committee, an important event in the history of our profession in this country, and he is satisfied, that it has exercised as great a beneficial influence upon the practice of dental surgery as any other cause within his knowledge. It served, as such a periodical should, to bring about a general acquaintance with the different modes of practice pursued by various practitioners, and, to a great extent, enabled each man to compare his own methods with that of others, and seize upon any improvement which offered.

It may be, that the advantages of a free interchange of ideas between persons employed in the same pursuit, and, particularly, that in which we are engaged, do not impress others as

deeply as it does your committee. He is satisfied, that nothing tends more towards its real improvement, and he cannot but believe, that the slow and laboring progress made by our important and useful profession for so many years, is to be attributed to the close, narrow-minded spirit which induced every individual engaged in it, (no, not every one; for, if this had been so we could not now look, with pride, upon the position it has taken,) in his self-sufficing confidence, which never looked beyond mere pecuniary benefit, to lock up in his small soul all he had thought or done in the pursuit of that vocation into which, by a good Providence, he had been placed, not for his own profit alone, but for the benefit of suffering humanity. And, he is satisfied, that the wonderfully rapid strides with which it has advanced in the last ten years, is to be attributed to a free interchange of views amongst its members. And this spirit has been more fostered and encouraged by this association, in spite of its defects, in spite of the disapprobation and fault-finding of those who were too much influenced by mere personal feeling to give it their hearty support, and endeavor to make it what they might suppose it ought to be, than by any other body of men any where. And it is his determination for the general good that must certainly continue to be effected by it so long as he has health and strength to give to the interests of this movement all the energy he can bring to bear upon it.

The Journal was freely contributed to by most of the intelligent members of the association and others who were not connected with it, and contains many valuable papers upon the theory and practice of dental surgery.

Besides the portion of the Journal devoted to the publication of original articles, a portion, as above indicated, was set apart for the republication of standard works which were not easily attainable and some which were entirely out of print. The following is a list of these works in the order in which they appeared:

Hunter on the Teeth: a Treatise on First Dentition. By Baumes. Translated from the French by Thos. E. Bond, Jr., M. D.

A Treatise on the Diseases of the Mouth. By J. B. Garrot, M. D. Translated from the French by J. B. Savier, D. D. S., for the American Library of Dental Science; with Notes by the Editors, pp. 100. 1844.

A New Treatise on the Theory and Practice of Dental Surgery. By J. Lefoulon, Surgeon Dentist, Paris. Translated from the French by Thos. E. Bond, Jr., M. D., A. M., pp. 125. 1844.

A Treatise on Second Dentition and the Natural Method of Directing it; followed by a Summary of Stomatic Semeology. By C. F. Delabarre. Translated from the French, pp. 171. 1845.

A Critical Inquiry into a Few Facts Connected with the Teeth. By George Waite, Esq., Surgeon Dentist, Member of the Royal College of Surgeons, Lecturer on the Physiology of the Teeth, Author of Surgeon Dentists' Manual, pp. 23. 1846.

Anatomy of the Dental System, Human and Comparative. By P. H. F. R. Blandin, Surgeon of the Hotel Dieu, Associate Professor of the Faculty of Medicine of Paris. Translated from the French by Robert Arthur, D. D. S., pp. 140. 1845.

Complete Elements of the Science and Art of the Dentist. By M. Desirabode, Surgeon Dentist to the King, assisted by his Son. Translated from the French, pp. 552. 1847:

Although published anonymously, this work and that on Second Dentition, by Delabarre, are understood to have been translated by Professor Harris, of the Baltimore College of Dental Surgery.

An Essay on the Structure and Formation of the Teeth in Man and various Animals. By Robert Blake, M. D. Revised and corrected with notes, by C. O. Cone, M. D., D. D. S., pp. 128. 1848.

A Popular Treatise on the Teeth. Containing a History of the Dental Art, etc., etc., also a Full and Accurate Account of the History of Ether or Letheon, for the Prevention of Pain, with Directions for Use. Designed for the Use of

Families, and as a Manual for the Student and Practicing Dentist. By Mayo G. Smith, Practicing Dentist. Illustrated by Numerous Engravings. Second Edition. 12mo, pp. 316. Boston, 1848:

The same volume contains a Treatise on the Inhalation of Ether, for the prevention of pain.

The Youth's Dentist, or the Way to have Sound and Beautiful Teeth.. Designed for the more Intelligent orders of Parents and Guardians. By J. R. Duval, Dentist; Member of the Royal Academy of Surgery, &c. Translated and supplied with notes. By J. A. Kinson, Surgeon Dentist, Member of the Royal College of Surgeons, London, &c. pp. 102. 1848.

A Treatise on the Diseases and Surgical Operations of the Mouth and Parts Adjacent, with notes of Interesting Cases, Ancient and Modern. Translated from the French of M. Jourdain, Dentist and Member of the College of Surgery, pp. 410. 1849:

This excellent translation, although published anonymously, is understood to have been made by P. H. Austen, M. D., of Baltimore.

A few more works will close the list of such as are in the hands of your committee.

Preservation of the Teeth. A Family Guide; being Familiar Observations on their Structure and Diseases; with Practical Illustrations and Engravings, embracing the Modern Improvements in Dentistry. By David K. Hitchcock, Surgeon Dentist. 12mo. pp. 92. Boston, 1840.

The Anatomy, Physiology, and Pathology of the Human Teeth; with the Most Approved Methods of Treatment. Including Operations, and the Method of Making and Setting Artificial Teeth; with thirty Plates. By Paul Beck Goddard, M. D., M. A. N. S., M. A. P. S., Demonstrator of Anatomy in the University of Pennsylvania, Lecturer on Anatomy, etc., etc. Aided in the Practical Part by Joseph E. Parker, Dentist. Large Quarto, pp. 227. Philadelphia, 1844.

The Natural History and Disease of the Human Teeth. By Joseph Fox, M. R. C. S. L., &c. First American from the

third London Edition. Remodeled with an Introduction and Numerous Additions. By Chapin A. Harris, M. D., D. D. S. Illustrated with thirty plates, 8vo, pp. 440. Philadelphia, 1846.

The highly valuable work of Mr. Fox, previously to the publication of this edition, was almost out of the reach of the profession in this country, and could only be obtained at a large cost.

Professor H. has done good service by thus bringing it within reach, and also by his additions, bringing it up to the great improvements which have been made in practical dental surgery, since the time of Mr. Fox.

A Practical Treatise on the Operations of Surgical and Mechanical Dentistry. Illustrated with four plates. By Samuel C. Harbert, Surgeon Dentist, 8vo, pp. 206. Philadelphia, 1847.

Teeth—their Structure, Diseases and Treatment. Illustrated by Numerous Engravings. By John Burdell, Dentist, 12mo, pp. 72. New York, 1847.

A Popular Treatise on the Diseases of the Teeth, including a Description of their Structure and Modes of Treatment; together with the Usual Mode of Inserting Artificial Teeth. By Robert Arthur, D. D. S., duodecimo, pp. 187. Philadelphia, 1846.

The Principles and Practice of Dentistry, Simplified and Condensed, for the government of those who value the Health of their Mouths. By R. D. Addington, A. B., D. D. S., 12mo, pp. 46. Richmond, 1848.

A Dictionary of Dental Science, Biography, Bibliography and Medical Terminology. By Chapin A. Harris, M. D., D. D. S., Professor of the Principles and Practice of Dental Surgery in the Baltimore College of Dental Surgery, Author of the Principles and Practice of Dental Surgery, etc. etc., 8vo, pp. 780. 1849.

The Medical Student's Guide in Extracting Teeth, with Numerous Cases in the Surgical Branch of Dentistry. With Illustrations. 12mo, pp. 76. Philadelphia, 1851.

A Practical Treatise on Dental Medicine; being a compen-

dium of Medical Science as Connected with the Study of Dental Surgery. By Thos. E. Bond, A. M., M. D., Professor of Special Pathology in the Baltimore College of Dental Surgery, pp. 307. 1851 :

Dr. Bond, in the publication of this valuable work, has very much added to the many obligations the dental profession is under to him for the warm interest, just appreciation of the merits of dental surgery, as a branch of the science of medicine, and earnest efforts towards its improvement. Supplying, as it does, a desideratum long felt. This work ought to be in the hands of every student of Dental Surgery.

With the publication of this work, the library portion of the Journal was discontinued.

Besides the Journal, other periodicals devoted exclusively to the interests of dental surgery have been, and are still published, all contributing towards the useful object of a freer and and broader interchange of views.

Stockton's Dental Intelligencer, was I believe the first of these.

There is no copy in the hands of the committee, and he does not know when it was begun or how long it was continued. It is not now in existence.

The New York Dental Recorder. Devoted to the Theory and Practice of Surgical, Medical and Mechanical Dentistry. Edited by Charles C. Allen, M. D., Dentist:

This periodical was commenced in October, 1846. It is published monthly, and has furnished a vehicle for many valuable and useful articles on all the branches of Dental Surgery. It is still successfully continued.

Dental Register of the West. Quarterly, was commenced in October, 1847 :

It is published under the auspices of the Mississippi Valley Association of Dental Surgeons. Its publication still continued.

The Dental News Letter, quarterly, is published by Jones, White & McCurdy, Philadelphia :

It was begun in October, 1847, and is still published.

Ether and Chloroform : Their Employment in Surgery, Dentistry, Midwifery, Therapeutics, etc. By J. F. B. Flagg, M.

D., Surgeon Dentist, Member of the Rhode Island Medical Society. 12mo, pp. 189, Philadelphia, 1851:

The importance of a treatise on this subject, at this time, is felt, and the experience of Dr. F. in the use of anesthetic agents, has well fitted him for the work.

ARTICLE VI.

Dental Education. By Charles W. Ballard, M. D., D. D. S., 872 Broadway, New York.

It would, perhaps, be well, before suggesting *improvements* upon the present system of instruction in dental science, to make known to the profession generally, the advancement which has been made upon the methods of education, adopted in former years, together, with the various causes which, acting separately or combined, have rendered such improvements necessary. The proper accomplishment of this object, seems to require, at the least, a brief history of dental education, as it has existed in this country, together with some remarks relative to the effects, which its different phases may have had, upon the *public*, as well as upon the profession.

Up to the year 1810, there were but few dentists practicing in this country, and these few had principally obtained the knowledge they possessed of the art, from practitioners in Europe. They were, so far as we are able to judge, all of them, men of some ability, and as well acquainted with the duties devolving upon them, as the existing state of dental science permitted. No works upon operative or mechanical dentistry had been written in this country, and but few in France; in England two or three valuable works relative to the teeth and their treatment had just appeared. It was, however, exceedingly difficult to procure any of these works here, and it was many years before any work of importance to the student of dental surgery

was published in the United States. In the mean time, the demand for dentists increased. The few who may be said to have given the profession its first start in this country, were generally doing a good practice; their time was well employed, and their services appreciated. The majority of them, we believe, received students in their offices and taught them the practical part of the art, which consisted, at that time, of carving ivory blocks, extracting and occasionally filling teeth.

Owing to the absence of American dental literature, and the scarcity and expense of that published in Europe, it became a matter of necessity that those who, at this time, studied in the United States, should be in many of the more scientific points relating to the profession, most sadly deficient. This was a difficulty in the way of dental education, which could only be overcome by rendering dental works more plenty, a thing more easily talked about than accomplished, as is evident from the fact that though the evil was known and felt, it was some years before the remedy was commenced, and many more had elapsed ere it could be said to be fairly under weigh. During this time the number of dentists practicing in different parts of the country was fast increasing; by the year 1825, they numbered a little over two hundred—of these some had obtained thei rknowledge of the profession from those first spoken of; but the majority had commenced practicing without any claim upon the public beyond that of having purchased a few secrets from such as possessed them, and were willing to sell, depending upon these secrets, and their own ingenuity and boldness, to help them into practice and out of difficulties.

As late as the year 1830, the means of obtaining information upon such subjects as related to dental surgery, were extremely limited. It is true books were beginning to be published, but they were mostly small popular works, and generally added more to the reputation of the authors than to the available literature of the profession. They were, however, productive of much good, by drawing the attention of the public to the importance of preserving the teeth.

In all of our large cities were to be found some few men,

who having possessed themselves of what might be called the theory of dental science, had put it in practice, and by much energy, perseverance and skill, were enabled to add greatly to the information which had been imparted to them by their instructors. These men became teachers in their turn, but like those who had trodden the ground before them, their time and skill were needed and demanded by their patients, and the number of students to whom they could give *proper attention*, was by far too small to supply the demand for dentists, and a host of pretenders rushed in to supply the deficiency. Dental surgery may with truth be said to have been at this time at its lowest ebb. Fortunately for us, it proved to have been only that dark hour which precedes the light of day.

The various methods in vogue, at this time, of obtaining a knowledge of the profession, or of founding claims upon the public as dental surgeons, may, together with the dentists thus constituted, be set down in three distinct classes.

Class first—consisted of those whose ignorance was their only excuse for the injuries they inflicted upon their patients, and ultimately their profession, as also of those, who having purchased or traded for a secret or two, depended upon bold faced and unblushing impudence for success. Very many availed themselves of their *natural advantages* in this respect, to obtain from the public a support, and in some instances as much more as would suffice to give them in the later years of their lives, a *separate maintenance*. Such men could only stand high in *their own* estimation, by dragging the profession down to their own level, and then trampling it under their feet, proclaim to the world that they were "neither uncommon or unclean," "they were not as other men." "They stood in high places and made long prayers for a pretence." These were the Pharisees of the profession. They could be best judged by their works, provided such judgment was as hasty as a coroner's inquest, as their works were exceedingly transient, save and excepting their work of demolition. Dentists to this day, suffer to some extent, from the odium brought upon their calling by the acts of these men. Those of the public who had

suffered from their ignorance, resented the injury by closing their doors to the whole profession. A dentist soon came to be despised, the name was a reproach, and those dentists who held a favorable position in the opinion of the public, owed it more to their character and reputation as individuals than to their abilities as dental surgeons.

Dentists, of the class I have been describing, knew little and cared less, about the duties devolving upon them, and yet they were always ready to receive pupils and instruct them in the *secrets* and *mysteries* of dental science, provided they were were well paid for it. The fees exacted in these cases, varied from five dollars to one thousand, and the amount of information imparted varied quite as much, though it bore no relative proportion to the sum paid. The length of time occupied by these initiatory proceedings, depended very much upon the ability of the student, and the ignorance of the teacher. It was generally conceded by these dentists, that the shorter the time wasted in this manner, the better for all parties, and the teachers were *always willing to communicate as little as possible.*

The second class, may be considered as consisting of those dentists, who having obtained as great a knowledge of the principles and practice of dental surgery, as their time, means or opportunities would allow, came at once to the conclusion, that so long as they did the best they knew how for their patients, and comported themselves in other respects as became good citizens, that they had done their whole duty, and neither the public or the profession had any further demands upon them. With this class of dentists, may be included those who commenced practice with little or no education, and were compelled, in order to compete with those around them, to add, by every means in their power, to the knowledge and experience that their practice was daily giving them. Many of these men, eventually became, to a certain extent, good practitioners, but of the best of them, it would be difficult to say whether the good or the evil which they had done in their day preponderated.

Dentists of the second class, were much better acquainted with their professional duties than those first described; and very many of them excelled in that branch of the practice, known as mechanical dentistry; and in justice to them it must be borne in mind, that at the time of which we are writing, mechanical dentistry was considered, by a majority of the profession, to be, by far, the most important part of dental practice.

Those who gained their knowledge of the practice of dentistry, in the offices or laboratories of dentists of this class, necessarily partook more or less of the characteristics of their teachers; certainly they could not then and there, take rank above them. To be sure, they stood higher in the scale than those who might be called the successors of the first class, nevertheless, they had much to attain and many obstacles to overcome before they could render themselves really useful to the public. It was the custom for the beginner, after he had passed through the usual course of instruction, and before he had commenced offering his services to the public, to spend some length of time in the office of his teacher, attending to the plainer duties of the mechanical department, and in some cases, doing the whole of the mechanical work. In many instances, this extra work was done for the purpose of liquidating the debt entered into at the start—(dentists being often made on credit)—others did it for the sake of embracing every opportunity of improving themselves, and others, again, fearing to encounter alone the troubles and difficulties always experienced by young men just entering the practice of a profession, did it for a support, while waiting, like Mr. Micawber, "for something favorable to turn up."

This course of procedure, undoubtedly, added much to their skill in that department of practice, and eventually enabled them to come before the public much better qualified to act as dentists than those who had adopted the more headlong course.

The relative proportion which these various classes of dentists bore to each other, may safely be set down to about one-half of the former to three-eighths of the second, and one-eighth of the third classes.

Dentists of the third class, although numerically less than either of the other classes, had, as a result of their course of practice and deportment generally, acquired far more reputation and influence. They had commonly obtained their knowledge of the profession by studying in the offices of such men as were in good practice and possessed a fair reputation in the localities where they practiced. Had these beginners stopped here, and settled down, after the manner of their teachers, no further description of them would have been rendered necessary. Fortunately for dental science, this was not the case. These few men seemed, from the outset, to have been impressed with the belief, that the resources of the science were by no means developed—that dental surgery held a position far beneath that to which it was entitled—that the odium which had been cast upon the profession was a natural result of the ignorance and unfounded pretension of a majority of its members, as well as a want of discrimination on the part of the public generally, between the perfect or imperfect performance of the various duties devolving upon the surgeon dentist; and, lastly, as all these evils could and should be remedied, it was their duty to devote a portion of their time and energies to the good work.

Unquestionably, the first step they could take, was to improve themselves; to become thoroughly acquainted with dental surgery as it was then practiced in this country and in Europe; to carefully sift the good from the bad; to give truths a more prominent position and to expunge all errors. This required years to accomplish. That which had been acquired by study had to be tested by experience, ere it could receive its proper value as a practical fact. The next thing to be done, was to make the profession acquainted with the result of their labors. Consequently, dental literature, of an improved character, began to make its appearance. This change at once advanced the profession. Many of the dealers in secrets lost immediately a most important part of their traffic; they soon had very few secrets to sell, and a still smaller number of purchasers. Consequently, they were obliged either to give up wholly the practice of dentistry, or to confine their attention to it, to a de-

gree such as nothing short of a prospect of losing their means of support could ever have compelled them. This was a great gain of itself, but much more was to be done. The few had presented to the profession their many facts, but a vast amount of valuable information was still treasured up by those who, from their ingenuity or experience, had become possessed of it. Every practitioner of standing had some theory or fact to add to the general fund ; not enough, perhaps, to fill a book, but still, far too much to be lost ; each one was anxious to give, and all were anxious to receive. Hitherto, the members of the profession had held aloof from each other, regarding those who proposed free interchange of thoughts and experience as spies, disposed to impart as little as possible, for the sake of gaining all the knowledge they could.

A reaction in feeling was now taking place, and to encourage it and facilitate the intercourse between members of the profession residing in different states, the American Journal of Dental Science was established. To this was also added the Library, which was nothing more or less than the periodical republishing of the principal works upon dental surgery which had appeared in Europe up to that time. The Journal and Library united, formed a most valuable addition to the reading matter now placed before the profession, and there were, comparatively, few members of it who did not avail themselves of the information contained in its pages. The benefits resulting from this were, undoubtedly, very great, and must have been most gratifying to those who had been endeavoring for years to advance the interests and standing of the profession.

By this time, a complete revolution had taken place in relation to the comparative importance of the two branches of dental practice. Mechanical dentistry, which had hitherto been considered as the most important branch, now gave place to the operative department ; it was now considered far more important, to arrest disease in its onward progress, than merely to hide its ravages. Operations upon the mouth and teeth, became now the most important part of dental practice ; but to become a skillful and scientific operator, required an expert-

ness in manipulation, that could only be acquired by actual practice upon the living organs, and that too, when guided by a quick eye, a sound judgment, and a thorough knowledge of the importance of the duties to be performed.

At this time, the best means by which a dental education could be had, were not much superior to those of previous years. It is true, books were to be had, and of the best kind. They were doubtless of great importance. They contained a large amount of information that was to a beginner invaluable. They did much towards providing him with a matured judgment, and a thorough knowledge of the organs upon which he was to operate, but they could not give him manual dexterity and skill. The question arose, as to where and how this one thing needful could be obtained. The mechanical branches, so far as they related to the putting up of artificial dentures, could be acquired in the laboratory of the dental practitioner, and under his immediate supervision, but success in operating upon the teeth *in situ* could not be attained in this way. It was only in rare cases, that a dental surgeon could prevail upon a patient to allow the presence of a third person, in the shape of a young student, who made it his business to be very inquisitive as to what was going on, and who was continually asking information relative not only to the operation then being performed, but to all the operations which ever had, or ought to have been performed in the patient's mouth. If the student made everything he did not understand the subject of inquiry, he was apt to be considered as impertinent, and if he did not do so, (and on the spot too,) he most certainly lost opportunities of gaining informatian, which to him would have been most valuable, and like opportunities might not again occur. But taking it for granted, that the student had made the best of his facilities for gaining information, he was still deficient in the most important particular. No dentist who can really well perform that exceedingly difficult and valuable operation, known as filling a tooth, will pretend to say that it can be taught properly by mere appeals to the sight and mind. It can only be acquired by actual manipulation on the part of the learner,

and unless he is constantly watched and guided by some person of skill, experience and judgment, he will be likely to do much injury to his patient, and to make but slight progress himself. The duties devolving upon the dentist in his laboratory, were such as enabled him to impart his knowledge of the mechanical department, while engaged in the performance of these duties, and that too, in the most practical manner, for the student could work with and be guided by him. Not so with operative dentistry, in the office there could be but one patient, and for that patient, but one operator—for how many were willing to pay for dental operations, and then be made the subject for clinical lectures? or what dentist could afford to spend his time, in superintending the operations of his student upon a patient who received the benefit gratis. Another great difficulty in the way, was the fact, that the reputation of the teacher, as a general rule, depended more upon his success in practice, than his ability to impart knowledge. As successful practice was necessarily an extensive one, hence a greater number of students, and a proportionably *diminished* time to devote to their interests.

An experiment had been made of teaching dentistry by means of lectures in medical colleges; but it became obvious to those who attempted it, that it was ineffectual, so far as the main object was concerned, and was attended with one disadvantage which would of itself more than counterbalance the good to be derived. The proportion of those attending medical colleges for the benefit of dental lectures, was exceedingly small; and those who attended for the purpose of perfecting themselves in the various branches of medicine, took but slight interest in the dental course. Dental students, in like manner, gave their attention to their own branch at the expense of the medical lectures. It hence became obvious, that though good physicians might be sent forth from the college, that good dentists could not; while those who studied the dental specialty would not be skillful physicians. How then could the *public* distinguish between the parties, *both coming before it with the same title to practice in either profession?* What was to hinder the

physician without a practice from filling his pockets with shining teeth, or the dentist from trifling with diseases of which he knew barely the name. There were some few members of the profession then as now, whose interest, it may be, caused them still to advocate the plan, ineffectual as it was; and they, too, asked, what was to hinder the physician or any one else from commencing the practice of dental surgery without due preparation? It is true, there was no law to prevent it; but those dentists who had the welfare of the public and profession at heart, knew that some guarantee should be given—some distinction should be made, so that patients might know in whom to confide. This course, alone, could secure to the profession the position to which it was entitled, and nothing less than this could purge it of many of its unworthy members. A distinction of any kind that could be recognised by the public, would, if bestowed only upon the worthy, force those who were not entitled to receive it either to qualify themselves or give up the practice of a profession they disgraced.

In 1840, the Baltimore College of Dental Surgery held its first session. The charter of this institution empowered its officers to bestow the degree of Doctor of Dental Surgery upon its graduates. About the same time, the American Society of Dental Surgeons was established "for the mutual improvement of its members and the elevation of the profession." It was necessary that the applicant for membership should have practiced a certain length of time and should pass an examination before a committee appointed for that purpose, ere he could be considered a member. The formation of this society was soon followed by others in different parts of the country; all of them, however, having objects somewhat similar and tending more towards the benefit of the practitioner than the student.

The method of instruction pursued in the Baltimore College of Dental Surgery, has now been in successful operation something over ten years; it was not adopted without due consideration on the part of its faculty. A sufficient proof of its superiority over the plan proposed of adding a course of dental lec-

tures to the regular lectures of the medical colleges, is given in the fact of Dr. H. H. Hayden's acceptance of one of the chairs of the dental college—*after having tried the former plan and found it wanting*. The faculty of the Baltimore College of Dental Surgery consists of

Professor of Principles and Practice of Dental Surgery.
" Operative and Mechanical Dentistry.
" Special Pathology and Therapeutics.
" Anatomy and Physiology.
Demonstrator of Mechanical Dentistry and Lecturer on Chemistry.

Three of the above offices are filled by practicing dentists, and two (special pathology and anatomy) by physicians. Lectures in the four departments, named above, are delivered each afternoon. The mornings are especially devoted to the *practice* of the various branches. The mechanical department being superintended by the demonstrator; and the operations in the infirmary by the professor of operative and mechanical dentistry. The infirmary attached to the institution furnishes every variety of case to be treated by the dental surgeon. Upon the patients thus procured, the students operate, being personally superintended and guided by the officer in attendance. By this means, students gain confidence, skill and dexterity in manipulation, as well as actual experience. These were the points of dental education that were not reached by any of the previous methods, and they are certainly of paramount importance. During the session of 1850,-1, upwards of seventeen hundred cases were treated by the students of this college. This fact is, of itself, so impressive, that we shall make no further remark upon it. At the present time, the number of graduates from this institution is about one hundred—of these, nineteen had previously earned the degree of Doctor of Medicine. The examination of candidates, for the honors of the institution, takes place in the presence of a committee chosen for that purpose, from the most prominent members of the profession. After the candidates have been examined in the more important points by the faculty, they are handed over to the tender

mercies of the committee, who, by the way, have opportunities of examining into the relative merits and demerits of the operations performed and the mechanical work put up—each student being obliged to produce specimens of his skill in both departments for such examination.

Now, we consider this method of education, somewhat thorough. If any think it can be improved, let them speak out. Improvement is the order of the day. But before improvements are *attempted*, let us know in what *particular* the present system is imperfect. It certainly has not failed, as some have insinuated; on the contrary, its prospects have brightened every year, and those prospects have been realized. The number of students has been slowly, but constantly increasing—each class has evinced an improvement on the part of its members over the class of previous years; a result of the increased experience of the faculty in teaching and the favorable reputation which the infirmary has obtained in the estimation of the public, thus obtaining for the students a constantly increasing number of patients.

A college of dental surgery has been in operation some six years in Cincinnati. It has labored under greater difficulties, and hitherto has not met with success equal to that of its elder sister, still it has not failed. Within the past six months, the college buildings, apparatus, &c. have been purchased by a number of dentists, residing principally, we believe, in the west; and we may now consider the institution as standing upon a firmer foundation than ever; as a greater number of dentists are directly interested in its success than was previously the case. Of the graduates of the Ohio Dental College, over one half had practiced from four to twenty years, at the time they entered the institution. The same can probably be said of the college in Baltimore; a most convincing proof that *something* is taught in these institutions, that cannot be taught in the office of a dentist, and cannot readily be attained in the ordinary course of a dental practice of many years.

Dr. C. A. Harris, tells us, in a late number of the Journal, that there is a general tendency evinced by dental students to

devote extra time to the practical departments at the expense of the regular lectures, and that it has required the stringent laws of the institution, and effort on the part of the faculty, to counteract this tendency. Dr. James Taylor, in a letter now before me, says, "I have found a greater disposition (on the part of the students) to obtain merely mechanical knowledge than I had hoped to see." Again, speaking of the classes, "the first session we had over *twenty students*, *since then*, classes have ranged from *eight* to *fifteen*." "*The first session students were not obliged to take all the tickets*, *subsequently* we have allowed *none but full course students*, and hence those seeking only *mechanical knowledge were shut out*." "Our object has been more to advance the interests of the profession than to obtain large classes." We certainly think that Dr. T. and his worthy co-laborers, deserve the thanks of the profession. They have worked hard and long, and we hope they will soon be reaping the reward of their labors. One thing is certain, the experiment has not yet proved a failure; on the contrary, it has been so far successful as to induce others to enter the field; arrangements are now making for the establishment of two new dental colleges, and we heartily agree with a gentleman standing high among dentists, and from whose letter we quote, "there is no possible reason why dental colleges should not be *well sustained*, and nothing but a jealous, selfish feeling on the part of some members of the profession can prevent it. This, time must overcome; no man properly regarding the true interests of his profession, can long entertain these feelings." "If dentists believe that these institutions are not properly conducted, they should at once set to work to rectify the evil." To this last quotation we would add our opinion that *dentists generally cannot but feel satisfied* with the manner in which dental colleges have been and are being conducted.

ARTICLE VII.

Filling Teeth when the Lining Membrane is Exposed. By CHAPIN A. HARRIS, M. D.

IN the July number of the Journal for 1849, I took occasion to offer a few remarks on filling teeth after the lining membrane had become exposed, giving at the same time, a brief history of the operation, together with the result, in very general terms, of my experience and observations upon the subject. About a year after, I treated of it in another place, at somewhat greater length,* but without entering much into detail. Within the last few months it has attracted the attention of several members of the profession, and the practicability of performing it successfully, does not now seem to be regarded with as much distrust as it was a few years ago. But, before entering upon the discussion of the subject, it may be well to recapitulate, in a few words, what was said in my former article, concerning the history of the operation.

In his "Principles of Dental Surgery," published in 1822, Dr. L. Koecker recommends filling teeth after the lining membrane has become exposed, saying, he had practiced the operation successfully for thirteen years.

The method of procedure pursued by Dr. K., consists, first, in the removal of the decayed part of the tooth, then, after wiping out the cavity with raw cotton, moistened in warm water, covering the exposed pulp with a piece of sheet lead, and introducing in the usual way, a filling of gold. His reason for placing sheet lead in the bottom of the cavity previous to the introduction of the gold, was this: he believed that the former metal had a more cooling and anti-inflammatory effect than the latter. When he wounded the lining membrane in removing the diseased bone, he cauterized the part with a red hot iron wire. He speaks of the practicability of performing the operation successfully, in the most confident terms, expressing the

* See 4th Edition of Principles and Practice of Dental Surgery.

belief that five teeth out of every six, may be preserved alive by it, and rendered useful for many years. He also affirms that he had succeeded in preserving the vitality of teeth after they had ached, and the lining membrane had become the seat of inflammation.

It is scarcely necessary to observe, that in the hands of other practitioners, the method of procedure recommended by Dr. Koecker, has not proved so successful. It has been, therefore, I believe, wholly abandoned.

Dr. Fitch recommends in his "Dental Surgery," placing a cap of gold over the pulp, previously to filling the tooth, and this has been found to succeed much better than lead.* But where the cavity is very shallow, it occupies so much space as to render the introduction of a good filling, exceedingly difficult, and sometimes impossible. Nor can a gold cap, in the majority of cases, be fitted with sufficient accuracy to the various irregularities of the walls of the cavity, to prevent it from being moved or partially displaced by the subsequent introduction of a filling. Besides, I am not convinced that any advantage can be derived from it, under any circumstances whatever. On the contrary, I believe a tooth can be filled over an exposed pulp, with greater certainty of success without it, than with it. At any rate, my own experience justifies the conclusion. I have performed the operation during the last sixteen years, in some hundreds of cases, and not in a single one, have I deemed it necessary to cover the pulp with a cap previously to the introduction of the filling.

Although the practicability of filling a tooth after caries has penetrated to the pulp-cavity, without causing pain, and *immediate* subsequent inflammation and suppuration of the lining membrane and pulp, is now so well established as scarcely to admit of doubt, the possibility of thus preserving their vitality for any considerable length of time, is still regarded by many

* Since the publication of my former article on filling teeth, when the lining membrane is exposed, I have been informed that a gold cap for protecting the pulp, had been used several times by Dr. L. S. Parmly, before the publication of Dr. Fitch's work.

respectable practitioners, as somewhat questionable. And, notwithstanding the apparent success of the operation in my own practice, I confess, I was unable to explain satisfactorily to my own mind, how a vacant space could exist between the filling and lining membrane, without causing some prejudicial effect upon the latter. That some hidden or mysterious resource of the economy was called into operation for its prevention, seemed very probable, but, until recently I could not exactly understand in what it consisted. It appeared to me that something more, than the mere ossification of the exposed surface of the pulp, took place; and the experiments I have made during the last fourteen months—the result of which I intend to give towards the conclusion of the present article, have revealed to me a most beautiful operation of the economy for the prevention of any bad effects which might otherwise result from the existence of such a vacant space.

From 1834 to 1846, I was in the habit of filling a tooth occasionally, in which the lining membrane was exposed; still, I scarcely thought it possible to preserve the vitality of the pulp by the operation for a great length of time, and hence it was only in cases where the presence of a tooth was called for by some peculiar and urgent necessity, that I attempted it, and then, only under the most favorable circumstances. But in July, 1846, I determined to perform the operation in every favorable case that should occur in my practice, and to keep a record of each, together with the result, or at least, so far as I should be able to ascertain it. This I have done, and will now give a brief statement of the result.

From the fourteenth of August, 1846, to the last of July, 1847, I filled sixty-eight teeth, in which the lining membrane was exposed—forty-seven for females, and twenty-one for males. During the year, I had an opportunity of examining forty-eight of the teeth, at periods varying from two weeks to nine months after the operations had been performed, and in only three of the cases had inflammation and suppuration of the lining membrane and pulp taken place.

In two of these cases, the patients were females, one a mar-

ried lady, about twenty-eight years of age, and as I have afterwards learned, had been pregnant about three months at the time the operation was performed; the other was a young lady, eighteen years of age, of a chlorotic appearance, with teeth of a soft, chalky texture. The tooth, in the first case, was a right superior central incisor. It caused the patient but little inconvenience, after the third week, for nearly four months, when it became sensitive to the touch, and painful when hot or cold fluids were taken into the mouth. Soon after, it began to assume a dingy, brown color, indicating the loss of vitality. In the second case, the tooth, which was a second molar, on the right side in the upper jaw, continued to be affected with impressions from hot or cold fluids, for two months, when it became very painful, aching severely, and was only relieved by the formation of an alveolar abscess. Soon after, I prevailed on the patient to have the tooth removed.

The subject of the third case, was a gentleman about forty years of age, of a full habit, caused by free living. The tooth, a first left superior bicuspis, continued somewhat painful from the time the operation was performed, until suppuration of the lining membrane and alveolar abscess occurred, which took place the tenth week after it had been filled.

I did not regard the result of the practice, thus far ascertained, as sufficient to enable me to determine definitely its ultimate relative success, although it had exceeded my most sanguine expectations, the time which had elapsed, had not been long enough to enable me to arrive at any positive conclusion upon the subject. I thought it possible that a change in the state of the constitutional health, or the action of some local cause, might so increase the susceptibility of the lining membrane and pulp to morbid impressions, that a diseased action, might, in some way, be excited in them through the conducting medium of the gold filling. Thinking this possible, I embraced every opportunity that occurred, of examining the teeth I had filled after the lining membrane had become exposed. I have seen many of the teeth I filled during the period already referred to, once or twice a year, and some-

times oftener, to the present time. I saw thirty-seven during the years 1849 and 1850, four of which I had not previously had an opportunity of examining since they were filled. Of the sixty-eight filled during the first year, I have subsequently seen sixty, and so far as I have been able to ascertain, loss of vitality has occurred in only five of the teeth. From three of these, I removed the fillings, cleansed the pulp cavities, and filled them very nearly to the extremities of the roots, hoping thereby to arrest the diseased action in their sockets, or at least, so far as to prevent it from extending to the adjacent parts. In one case I was successful, but the teeth in both of the others remained sensitive to the touch; the gums around them continued inflamed and swollen, notwithstanding the most active means were employed to restore them to health. Under these circumstances it became necessary to remove the teeth.

In the five cases in which suppuration of the lining membrane took place, it occurred as nearly as I could ascertain, within twelve months after the operations had been performed. It is possible, that one or more of the eight teeth not seen since they were operated on, may have lost their vitality, but it is scarcely probable, that if the result was known, it would vary very materially the relative success as shown by the sixty already noticed. It is also possible, that one or more of these may have lost their vitality since I saw them.

From August 19th, 1847, to July 25th, 1848, I filled sixty-two teeth in which the pulps were exposed, forty-six for females and sixteen for males. In three, suppuration of the lining membrane and pulps took place within six weeks from the time the operations were performed. In these cases, the patients were females, one a married lady about thirty years of age; the two others were young ladies—one about sixteen and the other twenty. In the first case, the operation was performed about two months after parturition, while the general system was in a debilitated condition, and more than ordinarily susceptible to morbid impressions. But with this exception, the general health of the patient was good, and her teeth were of a very excellent quality, though rather crowded in their

arrangement, and, in consequence of which, the approximal surfaces of several had been attacked by caries. In the left approximal surfaces of the right superior lateral incisor, it had penetrated to the lining membrane. It was removed, however, and the cavity filled without causing much pain, and as it was but slightly affected by cold, strong hopes were entertained that the operation would prove successful. But in about two weeks it became more susceptible to impression from heat and cold, soon after it commenced aching, and in about four weeks from the time it was filled, suppuration of the lining membrane took place.

The constitutional health of the patients in both of the other cases was poor; teeth soft, and the greater part of them more or less affected by caries. In one of these cases the tooth was a superior cuspidatus and had manifested a disposition to ache before it was filled; inflammation soon supervened ,followed by suppuration in about three weeks. In the other case, the tooth was a right second superior cuspidatus, the operation caused but very little unpleasantness, but the tooth was affected with pain when any thing hot or cold was taken into the mouth. At the expiration of six weeks it had assumed a brownish appearance, without, apparently, having caused any diseased action in the socket.

Suppuration and alveolar abscess occurred in a fourth case, about nine months after the tooth was filled. The patient was a married lady, twenty-six years of age; of a sanguino nervous temperament; had suffered severely for upwards of three years from dyspepsia; teeth pearly white, with long and narrow crowns, and of a soft texture. Many of them had decayed and been filled, both before and after her marriage, but the operations had been badly performed, and in nearly every case caries had taken place around the fillings. In the posterior approximal surface of the first left superior bicuspis, it had extended, when she applied to me for professional aid, to the lining membrane; this was considerably wounded in the removal of the decomposed dentine. I succeeded, however, in filling the cavity without causing much pain, but the presence of any thing hot

or cold in the mouth occasioned considerable suffering for several days. In a short time, however, the tooth ceased to be affected by these agents, and strong hopes were entertained that the vitality of the tooth would be preserved. But about seven months after, her dyspeptic symptoms having become grately aggravated, she was compelled to abstain altogether from the use of animal diet, and with the increase of the gastric derangement, the susceptibility of the tooth to impressions from heat and cold, returned. It soon became sore and sensitive to the touch, and in about seven or eight weeks it lost its brilliant white appearance; soon after an alveolar abscess formed.

The want of success in the last case resulted, doubtless, from constitutional causes. If the general health of the patient had been good, there is reason to believe that the tooth would not have lost its vitality.

Now, of the sixty-two teeth which I filled over exposed nerves during the second year, I have seen, since the operations were performed, fifty-one, and the four cases already noticed are the only unsuccessful ones that have as yet come to my knowledge. Twenty-three of the fifty-one, I have seen within the last two years; the others I have not seen since the termination of the year in which they were filled. It is possible, therefore, that some of the others may have lost their vitality since I last examined them. The same thing may have occurred to one or more of the eleven teeth which I have not seen since they were filled.

In two of the four unsuccessful cases, I removed the fillings, cleaned and filled the pulp cavities. One of these is still a useful tooth, though there is a discharge of a few drops of purulent matter from the gum, near the extremity of the root, every two or three months. The other tooth was a source of constant suffering, and I extracted it a few weeks after it was refilled.

During the third year, embracing a period from August 23d, 1848, to July 17th, 1849, I filled forty-eight teeth in which the lining membrane was exposed—thirty-three for females, and fifteen for males. In two of these cases, suppuration of the lining membrane and alveolar abscess occurred within two

months after the operations were performed. In both, the patients were males—one a gentleman about forty-five years of age; of a full habit, addicted to the use of alcoholic liquors; gums inflamed, spongy, with nearly straight and rounded margins; teeth short and slightly tinged with yellow; of a very good quality, but from neglect several had become affected with caries. In the first left superior molar, the disease had extended from the anterior approximal surface to the pulp cavity. On the removal of the decayed dentine, the lining membrane was exposed and bled so freely, that the cotton used in wiping out the cavity, was almost saturated with blood. But this immediately ceased on the application of a little spirits of camphor to the wounded vessels. The tooth had never ached and the introduction of the filling was effected without causing pain. It was very susceptible, however, immediately after, to impressions from heat and cold, and it soon became sensitive to the touch. In five or six weeks it began to ache; the pain gradually assumed a throbbing character, and at the expiration of two months an alveolar abscess formed. As the tooth continued very sore after the abscess had broke, I advised its removal.

The patient in the other case, was about twenty-three years of age; of a nervous habit, pale complexion, spare, had suffered for several years from dyspepsia; teeth long, well arranged, presenting a pearly-white aspect and rather soft in texture. A number of them had been attacked by caries and several had been filled two years before I saw him, but the operation having been badly performed, the teeth had decayed around the fillings. In the left superior lateral incisor, the disease had penetrated to the pulp cavity. The removal of the decayed dentine from this, and the subsequent operation of filling were attended with considerable pain, but after the operation was performed, the patient experienced but little inconvenience for five weeks. At the expiration of this time, however, it became painful whenever any thing hot or cold was taken into the mouth, but the pain was of so transient a character that it excited but little apprehension on the part of the patient for nearly two weeks, when it became more severe and constant. The

tooth, in the mean time, having become sensitive to the touch, I was consulted with regard to it, and directed the application of a leech to the gum. This gave no relief. In a short time the pain became constant, deeper seated, and very soon an alveolar abscess formed.

After the soreness in the tooth had somewhat subsided, I removed the filling, cleansed the pulp cavity, and in about two weeks filled it nearly to the extremity of the root. Since which time, about every two or three months, the tubercle at the extremity of the root suppurates and discharges a few drops of purulent matter through an opening in the gum. But this is the only inconvenience which the patient has experienced from the presence of the tooth.

In one other case, about eleven months after the tooth was filled, suppuration and alveolar abscess occurred. The patient was a lady about forty years of age, of sanguinous temperament, and enjoying very good constitutional health. The crowns of her teeth were long, slightly crowded and perceptibly tinged with yellow near the gums, which latter was regularly festooned and thin along their margins, of a lively rose color, and in every respect, indicative of health. Two or three of her teeth had decayed in their grinding, and several in their approximal, surfaces ; but in most of these places the disease had been completely arrested by gold fillings inserted by a skillful dentist in Philadelphia. But, subsequently to the operation, the posterior approximal surface of the second right superor bicuspis had become the seat of caries, and before she was scarcely aware of the existence of the disease, it had penetrated to the lining membrane. After making a separation with a file between this tooth and the first molar, I removed the decomposed bone and filled the cavity. The operation was attended with some pain, and the tooth was very susceptible to impressions from heat and cold for several days, but as this was not unusual, I did not apprehend any danger. In about two weeks, it entirely ceased to be thus affected, and for nearly nine months it remained free from pain. But, about this time, heat and cold again began to affect it. Soon after it became sore and ached. At the

expiration of eleven months the tooth turned dark, and an alveolar abscess formed.

In this case, I was not able to trace the suppuration of the lining membrane and abscess to any constitutional cause, though it may have resulted indirectly from some increase of nervous susceptibility of the general system.

I have seen, up to the present time, thirty-seven of the cases treated during the third year; and the three already mentioned, are the only ones in which necrosis has resulted from the operation. I would state, however, that I have only seen eighteen of the thirty-seven cases since the termination of the year in which the operations were performed. The result in the eleven cases which I have not seen since the teeth were filled, is, of course, unknown to me.

From August 17th, 1849, to July 22d, 1850, I filled sixty-nine cavities in teeth, in which the lining membrane was exposed; fifty-four for females, and fifteen for males. In two of the cases, the operation was immediately followed by pain and inflammation of the lining membrane, threatening suppuration. To prevent which, I removed the fillings and applied arsenious acid to the exposed pulps. About three hours after the pain had subsided, the arsenic was removed, together with the pulps, to the extremities of the roots. Two days after, the teeth were filled in the usual manner for operations of this sort. In one case, the tooth has remained free from pain and the socket from manifest disease until the present time; but, in the other, an alveolar abscess formed about three months after the tooth was filled. As the subsequent discharge of matter has been very small and occurs only every three or four months, it has not been deemed advisable to extract the tooth.

The patient, in one of the above cases, was a lady between twenty-five and thirty years of age, of a sanguino-bilious temperament; teeth pearly white, rather above the medium size, and not very hard. The tooth operated on, was the first left upper molar. In the other case, the patient was a young gentleman about twenty-one years of age; the tooth operated on a superior cuspidatus.

Suppuration of the lining membrane and alveolar abscess occurred in two other cases—in one, about four weeks after the tooth was filled; and in the other, in seven months. The subject of the first case, was a young lady about nineteen years of age, of a strumous habit, with pearly long-crowned teeth, of a soft texture and easily acted on by corrosive agents. She had lost six, and most of the remaining ones had been filled, but the operations not having been properly performed, had not prevented a recurrence of the disease. In the second right inferior molar it had taken place around a large filling in the grinding surface, and in the removal of the softened and decomposed dentine, the lining membrane was exposed to view in two places. As the first molar had been removed, the preservation of this became an object of much importance, and I determined to make an effort to fill it without destoying the pulp.

After having properly prepared, washed and dried the cavity, I placed on the bottom of it two or three drops of a thick solution of gutta percha in chloroform. When the chloroform had evaporated, I proceeded to introduce the filling, which I succeeded in doing without causing any permanent pain. For about two weeks the tooth was exceedingly susceptible to impressions from heat and cold; but, as it soon ceased to be affected by these agents, I indulged the hope that its vitality would be preserved. In a short time, however, it became sore and slightly raised from its socket. Soon after it began to ache, and from the throbbing sensation experienced, I was convinced that suppuration would soon take place, unless prevented by the immediate removal of the filling and the destruction of the pulp; but to this operation the patient positively refused to submit, preferring rather to endure the pain than to have the tooth interfered with at that time. At the expiration of a little more than four weeks from the time the tooth was filled, an abscess formed and discharged a large quantity of pus through an opening, which I made with a lancet in the gum, by the side of the tooth, for its escape. I afterwards removed the gold and filled the entire pulp cavity, but the presence of the tooth caused so much irritation, that, ultimately, I advised its removal.

In the other case, the patient was a lady, between thirty-five and forty years of age, of a sanguino-nervous temperament, and for several years had been affected with dyspepsia. Her teeth were of a soft texture, and nearly all were more or less affected with caries. In the right approximal surface of the left superior central incisor, the disease had penetrated to the pulp cavity. I succeeded in filling the tooth without much difficulty, and as it was but very slightly affected with impressions from heat and cold, the operation was regarded as successful. About five months after, the patient had an attack of gastric fever, and during her illness, the tooth become sensitive and slightly painful, which continued after the recovery of her health. At the expiration of seven months from the time it was filled, it assumed a brownish appearance indicating the loss of vitality. Under these circumstances I removed the filling, cleansed the pulp cavity, and in a few days filled the tooth to the extremity of the root. With the exception of a discharge of a few drops of pus, about every two months, from an opening in the gum, it has not since caused the slightest inconvenience, and is but very slightly discolored.

I have seen, up to the present time, forty-seven of the sixty-nine teeth filled during the fourth year, and the four cases just described are the only ones that have come to my knowledge, in which the operation was unsuccessful. In one of these, the suppuration of the lining membrane was, there is every reason to believe, attributable to other causes than the presence of the gold in the tooth. In one other, the operation was performed under such unfavorable circumstances, as almost to preclude even a hope of success.

From September 9th, 1850, to August 13th, 1851, I filled seventy teeth in which the lining membrane was exposed, fifty-eight for females, and twelve for males. Of these, I have seen up to the present time twenty-five, and as yet, so far as I have been able to ascertain, necrosis has occurred in only two of the teeth. The patients in both of these cases were females—one a lady about forty-five years of age, and the other a young lady of eighteen or nineteen.

In the first case, the tooth was a right superior central incisor, and inflammation and suppuration of the lining membrane took place about three weeks after it had been filled. The filling was immediately removed, and in about two days I filled the pulp-cavity and root. Two months have now elapsed, and not the slightest inconvenience has been experienced from the tooth since the last operation was performed. In the other case, the tooth was a left superior cuspidatus, and suppuration of the lining membrane and alveolar abscess occurred about three months after the tooth was filled. This tooth was treated in the same manner as the last, but as another abscess formed soon after the second operation, which discharged more or less every day through a fistulous opening in the gum, causing the patient incessant anoyance, it ultimately become necessary to extract it.

I have now, in as few words as possible, given the result of my observations on filling teeth, when the lining membrane is exposed, together with a few of the details connected with the unsuccessful cases which have occurred in my practice during the last five years. But for convenient reference, I have arranged the cases of each year, with the result, as far as ascertained, in the annexed table.

	First Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.	Total.
Number of teeth filled over exposed pulps,	68	62	48	69	70	317
For Females,	47	46	33	54	58	238
For Males,	21	16	15	15	12	79
Number of cases seen after the operation,	60	51	37	47	25	220
Successful cases,	55	47	34	43	23	202
Unsuccessful cases,	5	4	3	4	2	18

Now, if all the facts connected with the cases which I have treated, of exposed dental pulp, during the last five years, were known, up to this time, the foregoing report and table, might present a somewhat different result. But if I were, at the same

time, to take into account the number of teeth which were filled during this period, under unfavorable circumstances, I do not think they would materially vary it.

When the treatment of teeth in which caries has penetrated to the pulp cavity shall be better understood, it is possible that the vitality of a much larger relative proportion may be preserved. At any rate, so long as it can be done in nine cases out of ten, and even under the most favorable circumstances, I am clearly of the opinion that it should be attempted. A healthy living tooth, is certainly less liable to become offensive to the parts with which it is connected, than one deprived of a very large portion of its vitality. If the lining membrane and pulp did not contribute, in some way, to the preservation of a tooth, and to a *healthy vital connection* between *it* and the *rest of the body*, the process of ossification, as I have stated in another place, would, doubtless, be continued, until the pulp cavity was completely obliterated. But that they may be removed in many cases, without any *immediate* manifest injury, is a fact too well established to admit of doubt. Indeed, by removing the pulp and filling the place which it occupied, a tooth, which otherwise could not be retained without great inconvenience and suffering, may be often rendered serviceable for years, and I believe, in some cases, through life. But as the liability of a tooth to become a morbid irritant is, in accordance with a well established law of the economy, increased, in proportion as its vitality is weakened, the destruction and removal of the lining membrane and pulp should never be determined on, so long as the permanent preservation of the organ can be secured without it.

That the pulp of the tooth, when the operation is successful, undergoes some change, there can be no question. Drs. Harwood of Boston, Foster of New York, and Dwinelle of Cazenovia, are of the opinion, from experiments they have made, that it ossifies. Dr. W. W. Codman, of Boston, says, he has succeeded in many cases, in exciting ossification of the pulp by protecting it from the air with cotton. It is known, too, to nearly all dentists, that the pulps of teeth, under certain circum-

stances, ossify, and this transition process, is evidently the result of an increase of vascular action in the part, caused by irritation. Teeth in which the crowns have lost a considerable portion of their substance, either from mechanical or spontaneous abrasion, furnish a beautiful example of this process—a wise provision made by nature to prevent the exposure of such a delicate and sensitive tissue. It also sometimes occurs in teeth in which the crowns have suffered no loss of substance. In the latter case, it is doubtless the result of some unknown constitutional or local cause of irritation.

These facts would seem to justify the conclusion that the pulp of a tooth, when subjected, for a sufficient length of time, to the influence of an irritating agent, capable of exciting only a very slight inflammatory action, undergoes ossification; or rather, is converted into a substance resembling *crusta petrosa*, or what Professor Owen terms, *osteo-dentine*. When it fails to undergo this change in a tooth which has been filled after the lining membrane has become exposed, it is liable, from constitutional disease, or other causes, either to perish from derangement of its nutritive functions, or to become the seat of active inflammation, and to suppurate. But something more than mere ossification, or its conversion into *osteo-dentine*, takes place when a space is left between it and the filling. If this vacant space was not obliterated, we have reason to believe that the slightest increase of vascular action would, as has been justly remarked by Dr. Elliot, force a portion of the pulp into it, and thus brought in contact with the sharp angles of the walls of the cavity, active inflammation would be excited, and this, as a natural consequence, would be likely to terminate in suppuration. But nature, ever fruitful in her resources, uses means, as I have satisfactorily ascertained, at least to my mind, by a number of experiments made during the last fourteen months, for the prevention of such an occurrence. They consist, first, in filling the vacant space, with *coagulable lymph*, (*liquor sanguinis*,) effused from the lining membrane or exposed surface of the pulp—then, in its *organization*, and lastly, its *conversion* into *callus* and *bone*, or perhaps more properly,

osteo-dentine. Nature seems to employ the same means here, that she does in other parts of the body for the reparation of injuries. But this reproductive process can only take place when the lining membrane or pulp is actually exposed, and from which *plastic lymph* is evidently effused.

That this does actually occur at least in many cases, I am fully convinced, the fact having been most satisfactorily demonstrated to me in three instances, and I have examined other teeth in which there existed the strongest proof that this reparative process had been at work.

In June, 1850, I removed from the posterior approximal surface of the first left superior bicuspis, of Mr. C., a young gentleman about twenty years of age, on several of whose teeth I had operated seven months before, a temporary filling of "Hill's Stopping." At the time I operated on his other teeth, the lining membrane was so badly exposed in this, that I scarcely thought it possible to preserve the vitality of the organ by filling. I determined, however, after having properly prepared the cavity, to attempt to fill it with this compound, intending, if I succeeded, in doing so, to replace it, after it had remained a few months, with gold. After having accurately fitted the end of a small roll of it to the opening of the cavity, I made a deep, conical indentation in that part which, in its introduction, would otherwise have been likely to have come in contact with the exposed part of the pulp. I then forced it gently into the cavity, applying the principal part of the pressure on the outer edges near the walls of the orifice. This done, I pared off with a sharp knife, the protruding parts, and made the surface as smooth as possible. The operation caused a little pain, and the tooth manifested a slight disposition to ache, for two or three hours, but at the expiration of this time, all uneasiness subsided, and in this condition it remained for seven months. On removing the compound, and examining the cavity, which I was able to do very perfectly, as the second bicuspis had been removed previous to the first operation, I discovered to my surprise, a whitish, and apparently semi-translucent substance, slightly elevated from the bottom of the

cavity, of a conical shape, with two or three red specks in the centre. I at first, supposed it to be the pulp of the tooth, but on touching it with an instrument discovered that it possessed but very little sensibility, and was almost as hard as cartilage.

Fearing that the contact of gold might be attended with some bad effect, the cavity was refilled with the material used in the first instance, and on removing it at the expiration of six months more, the whitish protuberance at the bottom of the cavity, was found to be solid bone, almost as hard as the surrounding dentinal walls.

In the mean time I removed three gold fillings, two of which had been put in nearly three years before, under like circumstances, and in each case the bottom of the cavity was elevated, presenting the appearance of having been accurately adapted to the inner part of the gold. The other filling had been in only about nine months, as I was informed, and had been put in by a dentist of Bermuda while the patient was a resident of that island. But as the pulp was exposed, a gold cap had been beautifully and accurately fitted to the walls of the inner part of the cavity, which was in the anterior approximal surface of the first right superior molaris, and between which and the lining membrane there had evidently originally existed a considerable vacant space. The filling, however, had not been well condensed; incipient caries had commenced around it, and it was for the removal of this and the prevention of a recurrence of the disease, that it was taken out. In this operation, the gold cap was not disturbed in the slightest degree, and it was with some difficulty that I succeeded in removing it from the cavity. But having done this, I discovered a conical elevation at the bottom of the cavity, corresponding in shape and size to the concavity of the cap. It presented a whitish appearance, with several red specks scattered over the central part of it, and immediately in the center an ossific deposit, with minute spicula of bone radiating in every direction from it, were distinctly seen. On passing a delicate sharp-pointed instrument across this part, it was found to be hard and the grating produced was perceptible both to me and the patient. The other parts were of about

the consistence of cartilage or callus, and resembled it in appearance.

After having removed the partially decomposed portions of dentine from the walls of the cavity and replaced the cap, the tooth was refilled. I saw the patient two months after, and up to that time the tooth had not caused the slightest uneasiness.

I have also met with one other case, in which, after the removal of a filling that had been in about ten months, the bottom of the cavity presented a precisely similar appearance. The tooth in this case was a left superior cuspidatus, and the cavity in the right approximal surface.

When this reproductive process does not take place after the operation, it may be owing either to the want of increased vascular action in the lining membrane or pulp, or, to too much inflammation. A certain amount of increased vascular action, seems necessary to the effusion of coagulable lymph, an indispensable requisite to it, but when this is too great, it generally terminates in suppuration. This being the case, it is obvious that the success of the operation must very greatly depend upon the circumstances under which it is performed. However skillful the operator may be in the preparation of the cavity and the introduction of the gold, if these be unfavorable, his efforts to preserve the vitality of the organ, will, in a large majority of cases, prove unavailing. The health of the patient should be unimpaired, the tooth of a tolerably good quality, free from pain at the time the operation is performed; it should never have ached, and the pulp, peridental membranes and surrounding parts should be in a perfectly healthy condition. The cavity, too, should be of a proper shape for the easy introduction and permanent retention of a filling, and the smaller the point of exposure of the lining membrane the greater the prospect of success. It is also important that every particle of completely decomposed dentine should be removed, and if there be any oozing of blood from the ruptured vessels, this should have ceased before the filling is introduced.

But of the cases of exposure of the lining membrane met with by dentists, in teeth possessing sufficient strength of walls

to bear the introduction of a substantial filling, probably, not more than one in four, would be favorable for the operation.

The method of procedure which I pursue in filling a tooth when the pulp is exposed, consists, as I have stated in another place; first, in the preparation of the cavity in the usual manner, using the precaution not to wound the lining membrane if it can be avoided, though some of its small vessels are always ruptured in the removal of the innermost layer of dentine, then, to wipe out the cavity with a little raw cotton, moistened with camphorated spirits, which immediately arrests the oozing of blood; next, to introduce the gold, commencing, by placing the folds on one side of the cavity, and inserting fold after fold, without carrying those immediately over the exposed part of the pulp, to the bottom of the cavity, until every part except a small space over the nerve, is thoroughly filled. The folds should be pressed so compactly one against another, as to prevent their inner extremities from being forced against the exposed pulp, in the consolidation of the protruding part of the filling. The gold should now be thoroughly condensed, and the surface finished in a suitable manner.

I have avoided all detail here, as the method is so similar to that which I pursue in filling teeth under other circumstances, and which I have elsewhere described at considerable length.*

I would remark in this connection, that, during the last two or three years, I have occasionally applied a drop of the solution of gutta percha to the bottom of the cavity, and waited until the chloroform had entirely evaporated before I introduced the filling, and in some cases, believe, I have derived advantage from it. At any rate, the teeth seemed less susceptible to impressions from heat and cold. I have also used collodion, but not with as satisfactory results.

Dr. Elliot, of Montreal, a very ingenious and skillful practitioner, states, in an article on "filling teeth over exposed nerves," published in No. 4, vol. 1, new series of the Journal, that he places the gold "directly upon the living nerve, and in

* See 4th edition of Principles and Practice of Dental Surgery.

perfect contact with it, over the whole of its exposed surface," using, when the cavity is sufficiently deep to admit of it, *asbestos*, as a non-conductor, "*enveloped in a few thicknesses of gold foil.*" He moreover says, that within the last year he had "but two cases in which irritation advanced so far as to become troublesome to the patient," and that in "both instances, perfect and permanent relief was obtained by the use of leeches and a mild cathartic."

I had hitherto supposed that the direct contact of any metallic substance with an exposed dental pulp, would, as an inevitable consequence, be followed by irritation and inflammation, but it would seem, from the result of the experiments of Dr. Elliot, that the irritation is principally produced by impressions from heat and cold, conveyed to the nerve of the tooth through the conducting medium of the metal, or from its contact with the sharp angles of the walls of the cavity.

I have not yet tried Dr. E's method, but intend to very soon, and after I shall have given it a fair trial, will report the result.

It has constituted no part of my design, in writing the foregoing article, to treat on any other subject than the *practicability of preserving the vitality of teeth after the lining membrane has become exposed*, but for a very full and comprehensive treatise on "caries of the teeth, complicated with disorders of the pulp and peridental membrane," I will refer the reader to a series of very interesting and ably written papers by Dr. Arthur, now in progress of publication in the Journal. They, no doubt, will embody all that is known upon the subject.

ARTICLE VIII.

Historical Review of the Progress of Dental Surgery in the United States, with Reflections upon the Causes that have Accelerated it, and the means Necessary for its further Advancement.

In every department of human industry, the history of the United States shows a progress and development incomparably greater than have before been exhibited by any nation. The circumstances of this country are entirely novel in the experience of the world, and in every particular, the distinctive element has been exceedingly favorable to progress. Immense extent of fertile territory invites multitudes from over-populated and misgoverned regions, to become proprietors of a soil reserved for them from the foundation of the world, and waiting only for occupation to pour out its long accumulated riches. Political institutions, as free and equal as the heart could wish or the mind desire, draw together, under their generous banner, the noble-hearted and bold spirited from all lands. Universal education develops the effective powers and stimulates the energetic passions of the common mind. A wonderful commerce quickens the impulses of the people by allying their interests to the interests of all lands, extending a network of acute sensibilities over the whole globe, and making this country the sensorium commune of the world.

Before, under circumstances most favorable to human development, there was always some fetter upon the mind; something jealously guarded from the inquiry of the curious; something true by arbitrary decree, or false by the force of grim authority. Religion, of all subjects, the most interesting and exciting to the mind, the most ennobling to the heart, the most invigorating to the understanding, had been almost invariably a forbidden field to the bold inquirer. Politics, the religion of this world, next to the business of eternity, the most important of all themes, had also, except upon a few fitful opportunities, been an unlawful subject for examination. Shut out by authority from

the most interesting pursuits pertaining to time and eternity, the restless mind was driven into oblique lines of thought—was forced to weary powers it could not employ—fatigue desires it could not satisfy. Under such circumstances, rapid development was impossible. As in a garden of the olden time, the business of the gardener was to trim and prune his plants until every dwarfish tree should present a regular form as far different as possible from that designed by nature. So, the governing institutions of the old world had only in view to check the growth of mind, and to train it to obedience to artificial forms.

In this country, all was changed. A multitude of ardent minds found themselves suddenly let loose upon all subjects, for the first time, unprotected. Each was at full liberty to select its object, choose its mode of acquisition and carry to the utmost its attainment.

That scenes and results new and startling must result from causes themselves so novel and efficient might easily have been foreseen. That evils, or what had heretofore been considered such, must be developed with terrible exuberance and in gigantic magnitude could readily have been predicted; but that good, of a quality heretofore unknown, in quantity not conceived of, and of universality as the capacity of men to receive it, must be the grand ultimate consequence is as certain as that man was fitted by his Creator to subdue the world around him and within him, to the necessities of his own happiness. From the nature of things, the active in such a country must predominate over the contemplative. The world around is too vast, and the immediate and pressing occupations too many to permit quiet excursions into the invisible realms of the ideal world, except as a holiday trip. Physical science has made great progress; but in art, or the application of the truths of science to practical good, the onward movement has been with far greater velocity.

Men are always willing to pay for comfort to the very utmost extent of their means. In this country, the masses are able to pay for them. Hence the ready way to wealth is to increase

means and appliances by which the wants of the many are supplied, their forces multiplied, their labors diminished, or their infirmities relieved or counteracted. Here, it is the multitude who pay, and the multitude look for comfort as the great desideratum. Where it is otherwise, the efforts of ingenuity must be directed to gratify the luxurious few, who, possessing comfort, are ready to lavish their surplus means upon the gratification of cultivated or capricious fancy, or what is commonly known as taste. Under such circumstances, excellence of execution, which creates a variety in the possession, takes the place of the universal adaptedness which anticipates a universal demand.

Among the arts medicine has always been prominent. Founded upon a universal want, it has always been of universal acceptability.

In the progress of the arts in the United States, medicine has received a large share of attention and made very considerable advancement; but, certainly, its progress will not bear comparison with that made by the more purely physical arts. There is no contrast between past and present medicine at all corresponding to the difference between an antiquated flat-boat and the modern leviathan steamer; between the former post-chase and the modern locomotive.

Superficial observers, regarding this disproportionate development, have been led to complain, that medicine has been laggard in the movement of mind; but we must consider that medicine had reached great maturity when mechanics were in infancy. Medicine has always been cultivated; has always been a science, and had acquired at the time the new movement took place, by far the greater part of what was possible for it to acquire. Moreover, medicine, from its nature, is restricted in its bounds, and limited in its means. It is a struggle against what is ultimately inevitable, by instrumentalities only partially effective.

Yet, *practical* medicine has made much advancement among us; and whatever may be thought of the great excellence attained by foreigners in the knowledge of the minute animal

structure and the discrimination of morbid conditions and locations, we have no hesitation in asserting, that the proper art of cure has been brought to as great perfection in America and through the efforts of Americans, as it has been elsewhere and by other agents.

In surgery, the artistic talent of the American mind has had considerable scope for action, and many valuable improvements have been made by our surgeons, of whom we have never been without some acknowledged equal to the very best of their contemporaries. Indeed, when we consider that our operators have seldom had such abundant opportunities for the exercise of their skill, as have been afforded to those of other nations by the terrible accidents of war, it is surprising that our surgery has been able to sustain its relative position. Yet, in all its departments, it will suffer nothing in comparison with the highest development of the art yet attained in Europe. Dental surgery, as at present practiced, is almost an American creation, for although operations upon the teeth have been practiced since the days of the Pharaohs, and probably before, yet the rude and simple character of the early manipulations hardly give them a claim to be regarded among the effects of scientific art, and until comparatively lately, but very little improvement seems to have been made in this department of surgery.

To the earlier physiologists, the teeth were an inscrutable mystery, and their diseases were as unintelligible as their structure. Hippocrates regarded them as a glutinous exudation from the jaws. Aristotle taught that men had more teeth than women, an unpardonable error, because so easily corrected ; he also supposed, that these organs continued to grow during life. Aretæus says, that God only knows the cause of tooth-ache : and Celsus recommends as odontalgic applications, the actual cautery and hot oil.

After the writings of Ambrose Paré had given a new impulse and a right direction to surgery, dentistry began to share the interest awakened for operative medicine. The organization of the teeth were considered in the several works on physiology, and was at length almost truthfully described by Leeuwenhœk Yet when Fauchard published in 1728 the first systematic

treatise on dental surgery, operative dentistry was evidently in a rude state. From this time, however, considerable improvement was made, up to the close of the century, when Hunter wrote his famous work on the teeth, and thus constituted another epoch in the history of the art. Bichat and other French anatomists and physiologists also paid a fair proportion of attention to the teeth, and a number of surgeons and dentists published books and papers upon the subject. In short, dentistry had now become an important and valued branch of the healing, and perhaps we may add, the decorative, art.

In the early years of our colonial existence, it is probable that no attention was paid to dentistry. The people were scattered over a wide extent of country, and generally could have had no money to expend in such extravagant luxuries as dental operations, even if such had been at their option. Their teeth had probably not yet formed the American habit of premature decay, and if occasionally one became refractory, it is probable the village blacksmith removed it with his pincers.

But as wealth increased and cities became populous, arts of all kinds became in better demand, and what previously were unknown or regarded as luxuries, became recognized wants.

The first immigrant who ventured to practice dentistry as an exclusive pursuit, seems to have been a Mr. Woofendale, who settled in New York in 1766. Not meeting with success, he returned to Europe two years afterwards. During the revolution, M. Le Mair, came over with the French army, and established himself as a dentist, and was followed by Whitelock an Englishman. Of these persons, Dr. Harris observes "with regard to the professional abilities of Le Mair and Whitelock, little is known, but it is probable they were limited and that their practice consisted chiefly in constructing artificial teeth from blocks of ivory."

Mr. Gardette, so long and so favorably known to the citizens of Philadelphia, came to this country in 1783, and with the exception of Mr. John Greenwood, may be regarded as the first dentist worthy of the name, who established himself in this country.

Mr. Greenwood was an American by birth, and commenced practice in New York, in 1788, where he continued almost the only dental surgeon for twelve years—a fact which shows how very little dentistry was appreciated in those days.

Mr. Greenwood was an industrious and ingenious man, and soon acquired reputation among the few who perceived the value of such services as the then state of the art enabled him to render.

An upper set of teeth, carved from hippopotamus ivory, is yet to be seen in the museum of the Baltimore College of Dental Surgery, made by Mr. Greenwood, for General Washington, together with a letter from General Washington to Mr. Greenwood, expressing his gratification with his services. The teeth were doubtless good of their kind, and for their time, but by the side of a set of modern fashion, they may be supposed to have been intended for some different purpose.

Dr. Hudson, of Dublin, established himself in Philadelphia, in 1805, where he acquired, and deservedly too, a great reputation which he enjoyed for twenty years. We are not aware that any of these gentlemen contributed any thing to the literature of their profession.* The constant demand for their services by persons able to remunerate them, called forth all their ingenuity in devising the readiest and most complete substitutes for deficiencies of the natural teeth, and made them skillful in performing the operations then in use upon these organs when diseased. Carving artificial teeth from bone, neatly introducing human teeth, extracting and filling with more or less completeness, and constructing the cumbrous spring-work by which their rudely constructed sets were made to do their reluctant office—these occupied the attention of the dentist. He had no help from without. Himself designer and artificer, he was compelled to rely upon his own mechanical skill for whatever he needed in his manipulations. Even his instruments were of his own workmanship.

* Dr. Gardette wrote a paper on the Transplantation of Teeth, recently republished in the American Journal of Dental Science.—Eds.

Under such circumstances, there was doubtless much improvement made in mechanical and operative dentistry, though the condition of the profession did not create a demand for literary effort. But the gentlemen above named did not restrict themselves to the mere mechanism of the profession. They were well informed in general medicine, and their pupils were required to attend medical lectures, and read medical books, and thus a class of educated dentists was gradually formed.

This class, however, was necessarily very small. Men engaged in a lucrative practice, operating during the day, and doing goldsmith's work at night, could not devote much time to the instruction of pupils. Besides, the advantage of a certificate of pupilship from one of the highly reputed dentists, was so great that very large fees were paid for such tuition, imperfect as it was. Five hundred dollars was commonly asked for the office fee of a student, and of course, very few could avail themselves of such dearly purchased advantages.

The great benefit conferred by these men upon the profession, independently of what improvements in operating they may have made, consisted in establishing a class of educated gentlemen, acquainted with medicine, but practicing dentistry as a specialty. In fact, they laid the foundation of the present *respectability* of dentistry.

In 1800, Dr. Horace Hayden commenced business in Baltimore. He had enjoyed no instruction except what he had derived from the few books then to be found, and no doubt was very ill qualified to practice. But he was a very honest minded, enthusiastic man, and learned as fast as he could, and from every accessible source. He studied medicine and surgery thoroughly, and became expert in geological science, and well versed in natural history. His bent of mind was decidedly *scientific*, and his untiring curiosity penetrated into every open door of nature.

Dr. Hayden was not only a student, he was a good writer, but never wrote unless he had something to say. His writings, though chiefly upon medicine and natural science, include some valuable papers upon dental subjects. In 1825, he published

in the New York Medical Recorder, a paper upon Conjoined Suppuration of the Gums. A year or two previously, had appeared a paper by him, on the nature, growth and formation of the human teeth, with an explanation of the cause of their decay, particularly of its uncommon prevalence in the middle and northern states of North America—a paper valuable, as showing the existence at that time of the peculiarity so distressingly observable, and so unaccountable now—and also the acute and observing character of the writer's mind. Another paper upon the appearance of the teeth of those who have died from strangulation, was published in the Encyclopedia of Medicine, and another in the New York Repository, on the use and functions of the salivary lachrymal, and other glands in the human system. This last paper was published in 1818, and prior to all other publications upon dental subjects, in our medical journals, at least so far as we are informed.

Dr. Hayden did much to elevate the literary and scientific standing of the dental profession. He was the first to give it caste in Baltimore. His own associations were with the most learned and literary men of the city, and necessarily his personal consideration was reflected upon his profession.

Books and papers on dental surgery and collateral subjects, now began to multiply. Mr. L. S. Parmly, published his "Practical Guide," in 1819. Dr. E. Parmly and Dr. Flagg, appeared as authors in 1822. Dr. Trenor in 1828, and Dr. Fitch's large and valuable work was published in 1829. In 1839 Dr. Harris brought out his well known and excellent work on practice, and many smaller works, by various authors, have, from time to time, been given to the public.

In periodical literature, nothing was attempted until the publication of the American Journal and Library of Dental Science, in 1839. The number of dentists was now sufficient to sustain such a publication, and its effect in consolidating and vivifying the scattered elements of the profession was as cheering as remarkable. The bold step of founding a college for the regular education of dentists, soon followed, and the institution at Baltimore was ushered into existence. Then followed

the American Society of Dental Surgeons, the several state associations, the Ohio College, and a number of additional periodicals.

While these aggregated efforts were making to consolidate and legitimatize the profession of the dentist great improvements had been made in operative and mechanical dentistry. The manufacture of artificial teeth has been brought to such perfection, that it seems impossible to make any material improvement in them. The mode of inserting artificial pieces, has been greatly improved—filling is now done with far greater completeness and certainty than before; dental instruments have been much improved in form, adaptedness and construction, and the *medicine* of the art, the indispensable collateral knowledge of the body, its diseases and their remedies, has been much advanced.

The progress of dentistry for the last twenty years, has indeed been prodigious, and American dentistry now stands foremost in the world.

The causes of this progress must be sought, first in the melancholy fact that the teeth of Americans are subject to decay to an almost incredible extent. We all know that a perfect set of teeth is now a curiosity. That scarcely a lady out of her teens can be met with whose mouth is not made up of plugs and porcelain, that the dentist's bill is larger than the grocer's, and that tooth-ache, under our free institutions is so universally tormenting, as fully to countervail the advantage of trial by jury—we know these things, and inasmuch as demand regulates supply and stimulates exertion, there is no difficulty in accounting for the improvement in an art so much in use as dentistry.

In the next place we must look for the cause of progress in the facts we have already considered as constituting the philosophy of our national character. The universality of want is felt by the *moneyed multitude*, and not by the *moneyed few*. Hence the direction of skill must be to supply the wants of the many, rather than the tastes of the few. Dentistry has not only a brisk demand, but a good market. And again, we must

look for the cause of progress of dentistry in the freedom to think and to act, and the facility of communicating thought and action so distinctive of our race and times.

(To be Continued.)

ARTICLE IX.

Cheap Artificial Teeth, and Cheap Dental Operations in England.

In my last communication I instituted a comparison between the cheap advertising teeth-mongers and those more respectable members of the profession, who practice in a more private manner, and trust rather to reputation than to chicanery and humbug for success. And I think I succeeded in showing, very distinctly, that the public were cheated by either the one party or the other.

I shall now proceed to redeem my promise of exposing some of the tricks of the former class—both as to artificial work and the operation of plugging or plastering, and to effect this the more readily, I will introduce my readers to one of the class, (as a specimen of the whole.) A Mons. Le Humbug, a well known member of the two and six-penny fraternity, and a gentleman who has obtained an unenviable notoriety.

This Mons. Le Humbug advertises to stop a single tooth, permanently, with his indestructible, incompressible and indescribable cement, at the low price of *2s. 6d.* each, and presuming that this wonderful cement is nothing more than a mixture of silver filings, quicksilver and bismuth, I beg to introduce him to the reader.

You must fancy Mons. Le Humbug bedecked in his gorgeous chintz flowered dressing gown, his head surmounted with a tinselled skull cap, fuming away a real Havana, and occasionally moistening his lips from a Dresden cup of chocolate or coffee—his eyes resting with intense delight on the newspaper in the

interesting occupation of spelling his own name and tracing the efforts of his lubricous fancy in the form of an advertisement. As the poet says, however, time flies—it is 10 o'clock, and his pleasing occupations are disturbed by the more pleasing intimation that a pigeon is trapped and waiting in his sanctum to be artistically plucked. After a proper interval the coffee and segar are discarded, and the professor enters his studio with an air somewhat between a theatrical braggadocio and a veritable barber. After the usual allowance of good mornings, and some sapient observations on the weather, the following dialogue commences:

Patient—I perceive by your advertisement Mons. Le Humbug that you stop teeth at 2*s*. 6*d*. each.

Professor—Yaas saar.

Patient—As I have one that requires stopping, will you be kind enough to do it for me?

Professor—Ya-as sa-ar, will you be so kind ash to open your jaws—ah, this is the tooth, ah—are in a dreadful state, but I will stop it with my beautiful shement which will last your life time sa-ah, and longer than that.

And he immediately proceeds to plaster in his beautiful cement—holes produced by caries, indentations on the teeth, and the interstices between them, it matters not, all are plastered up with the beautiful shement—and having in a workmanlike manner levelled the surfaces, he without hesitation or consultation proceeds to beautify (i. e. destroy) the teeth by the application of his *mineral acid*. During the ten or fifteen minutes that this takes, the patient sets patiently in his chair, his mouth open with wonder as well as for the convenience of the operator, contemplating the proceedings of the good Samaritan with a kind of instinctive dread of the result. At length the professor announces the termination of his labors, and with great self-complacency, points out the benefits he has conferred on the patient's mouth, and explaining, in his own elegant phraseology, the great results that will accrue from his having stopped *ten* teeth and cleaned the whole, coolly demands ten guineas as his very moderate fee.

The poor patient is struck with horror and astonishment—God bless me Mons. Le Humbug, I had only *one* decayed tooth, and did not want any others stopped or cleaned, and I will not pay ten guineas, ten guineas really is too ridiculous. Let me tell you Mr. Professor, that I consider it as an attempt to swindle me out of my money. Well sa-are, replies the professor, pocketing the swindle—well sa-ar that is *my fee*, and I shall expect to be paid, or shall at once commence legal proceedings. After a few genteel compliments, and sundry hard words, too true to be bearable by any but the most unblushing swindler, the poor patient who begins to find himself in a fix with Mr. Extortioner, and endeavors to compromise the matter by an offer to pay part—indeed, he has not the whole amount in his pocket—but the worthy professor, who is not to be foiled in this way, kindly offers to take what ready cash he has, and his card and promise to pay the remainder. This arrangement being complete, he allows his victim to leave the house, and immediately gives instructions to one of those legal harpies, a low attorney, to proceed at once for the balance, or if his victim has shown the white feather, for the whole amount, *honestly* sinking the portion he has received. By the next post the *patient* receives a six and eight-penny billet, and being perchance rather nervous and not over anxious of appearing in a court of law, pays the demand, costs included, of course a mere trifle compared with the advantages he has received from Mons. Le Humbug, for in all human probability in less than a week or even in a few hours, the patient finds on examining his mouth he has swallowed (of course to the great benefit of his digestive organs) the whole of the professor's beautiful shement, while in a few weeks, he is convinced of the irreparable injury his beautifying acid has done to his teeth, and if per chance any portion of the cement remains, he is converted into a walking galvanic battery, and thus having been, by the seductive attractions of *cheap* dentism, fleeced in pocket and injured in person, he determines to employ a respectable non-advertising dentist, to repair, as much as may be, the damage occasioned by the two and six-penny practitioner.

Thus much of stopping; there is, however, another and more fertile source of swindling in the preparation of artificial teeth.

In these cases, as in the last, the patient has no sooner entered the precincts of dentism than the extortion and swindle commences. Having inquired the price of the different kinds of teeth, ticketed by advertisement-like remnants at a cutting shop, to commence from five shillings each. The *Professor* (and it must be remembered, that these kind of fellows profess a degree of shrewdness that would fit them for a very high station in the swell mob) measuring at a glance the pecuniary capabilities of his victim, and the probable amount of his brains, vary in his demand according to his indications. If he thinks him, and he is seldom out of his calculation, perfectly gullible, he will probably demand five pounds for a tooth, fabricated out of a piece of denture made and grooved whilst the patient is waiting; and this apology for a tooth being *forced* between two others and kept in that position by lateral pressure is said to be fixed by atmospheric pressure; or, in their own vulgar phraseology, by suction. Should the patient express a wish to have a tooth *on gold*, our Moses Humbug immediately warrants the superiority of his method above all others, and frequently succeeds in extorting three and occasionally five times the price that would be charged by a respectable dentist, for the finest materials and the most finished workmanship *properly* adapted to the mouth; for it must be kept in mind, that our worthy professor, when he is guilty of such extravagance at all, never uses gold of more than fourteen, or at the utmost sixteen carats. Indeed, since the discovery of the electrotype method of gilding, which he considers a godsend, he rarely ever uses this, but contents himself with gilded silver, brass or pinchback, which artificially colored and well polished, not only pass under the designation of gold, but are charged for as such.

The number of persons annually fleeced by these advertising gentry, is really wonderful, and not the less so that, generally speaking, they are of a rank in life that might be supposed to insure something like common sense and a knowledge of the world. Could any common sense person suppose, for instance,

that a nobleman, and presumed to be a man of letters too—could put himself in the way of being victimised by one of these harpies, and yet such is the fact.

This nobleman was induced by some circumstance or other to drive to one of the fellows ; seeing him well dressed, a circumstance that has a marvellous effect in raising the price if not the quality of the article, demanded three guineas each for *his best* artificial substitutes.

The model was taken and the following day appointed for their insertion ; in the interim, however, Monsieur Jackall, who is tolerably well trained for the purpose, and frequently a partner in the proceeds, obtained the gentleman's name and address from his coachman.

At the time appointed on the day following, the nobleman was ushered into the presence of the professor, who immediately exclaimed, good morning, *my lord!* your lordship's teeth are ready, and very beautiful they are ; not made of the common material, *my lord*, such as I use for common people, *my lord*, but such as are peculiarly fitted for *your lordship's* mouth. Having thus lorded his patient, he inserted the tooth, and then a few more bows and scrapes. His lordship somewhat annoyed by all this fulsome nonsense, demanded the price, when he found *ten guineas* demanded for what he had agreed to give three. His lordship coolly put his hand to his mouth, removed the teeth, and presenting them to Mons. Le H., made his congee. A legal application was made, but his lordship not being made of spongeable material, was not to be frightened in that way. The case was eventually tried at Kingston, and a verdict returned in favor of his lordship, leaving to Monsieur the intense gratification of liquidating the legal expenses. The barefaced impudence of these fellows is, in some cases, so extraordinary, even for them, that it could scarcely be credited, unless coming from a source in which implicit confidence may be placed.

One of these tricks, and by no means an uncommon one, is called, making a set on spec, and consists in making a duplicate set ; and when one set is in the mouth, presenting the

other to the patient and demanding payment for both; observing, he never makes one set alone in case of accident.

It might be thought, that such a barefaced swindle *could never* succeed, but fact says otherwise. The patient it is true, may remonstrate, nay, at first determine not to pay—but the legal functionary is immediately employed, and the sufferer not likely to appear in a court of law on a matter to which a degree of ridicule is ridiculously attached, pays the money and keeps his *own* counsel instead of employing one.

The following case for which I pledge my veracity may draw somewhat largely on the credulity of my readers.

A maiden lady, residing at Richmond, applied unknown to her friends, to one of these monarchs of *dental economy.* She made no arrangement as to price—in due time, the *day set* was made, and one for *night* also, and the lady being an invalid, the extortioner's assistant went to Richmond to place them in the mouth. When the feat was accomplished, *five hundred pounds* was demanded as the price of the piece of rascality. For fear of public exposure she paid the money, the worthy's assistant receiving five pounds, as his share of the spoil, as a gratuity.

This very assistant is now practicing on his own account at the west end of London, and no doubt will peruse this article with some degree of curiosity and satisfaction. Whether he fleeces his own patients in the same manner, I will not venture to say, but the above anecdote comes from *his own mouth.* Other cases occur in which gilded brass, or pinchback, is employed in place of gold. Teeth are pivoted with iron, any thing sufficiently durable to last till the patient has paid the fee and got outside the door.

There would be no difficulty in furnishing cases of this kind ad infinitum, and that too among the higher classes of society, who, however, generally speaking, having been foolish enough to employ these cheap dentists have sufficient prudence to keep their own counsel, and not render themselves victims to ridicule as well as fraud. Do not these cases show the degraded state of the dental profession in England, and yet no sooner does any one attempt to expose them than he is *mirabile dictu*, by the

respectable portion of the profession of a wish to obtain notoriety. They not having the common sense or common honesty to place themselves in the same position, but contented to remain tame and indolent spectators of a species of rascality, that reflects disgrace on both their profession and themselves. Surely, men who tacitly countenance malpractices of this kind, are little less culpable than those who practice them, more particularly, as they might, by firmness and decision, at once put the public on the irguard, and place the perpetrators *hors de combat.* From what this apathy arises I will not pretend to say. I cannot suppose it possible that they are all influenced by mean and contemptible feelings of *jealousy* that prevents their acting in concert, and can only imagine that they are blessed or cursed with an unenviable portion of lethargy, and care for nothing that does not effect their pecuniary interest. R.

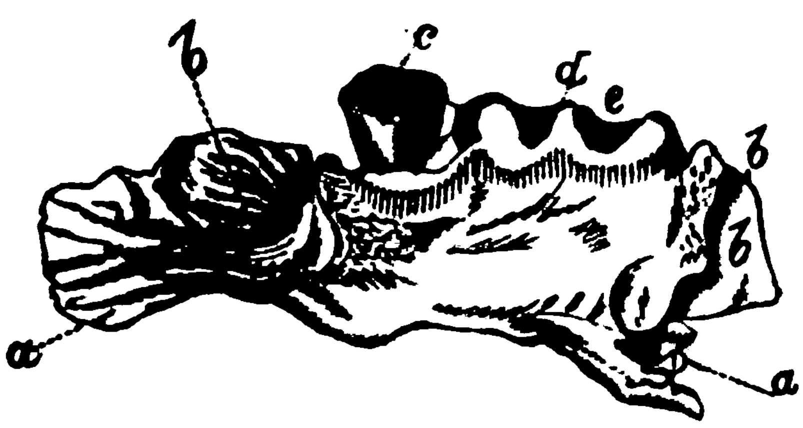
ARTICLE X.

Cases of Cancrum Oris. By J. L. Levison, of Brighton, Eng.

Mr. Editor—As a proof of the esteem I entertain for the American dentists, I willingly (at your request) send an article for your Journal, promising other communications should you desire them. In the Lancet of last Saturday, (June the 7th, 1851,) there is an interesting case of cancrum oris reported, as under the care of Dr. Burrows of St. Bartholomew's Hospital, the patient being thirteen years old. In the introductory remarks it is stated, that the disease is attributed to debilitating causes, and that it often supervenes on exanthematous diseases, &c. And as the subject is one of interest to the practical dentist, I will select a few cases from my note book, as furnishing *data* of some of the predisposing causes for the development of this affection, the most malignant instances in

my own practice, I observed during my residence at Hull, which was almost endemical among the poor, in the worst localities of that town. It should be premised, that Hull is built on an alluvial deposit of mud thrown up from the river Humber, that it is situated very low, having also canals intersecting all parts of the town; and besides, there is the river Hull on one of its sides, and the river Humber on the other. It is, therefore, generally damp, which singly often causes great debility, &c., that dyspepsia is an endemical disorder of the place. Besides which, it is always more or less subject to low nervous and typhoid fevers, and suffered a great mortality during both visitations of the Asiatic cholera. I was asked, on one occasion, by a surgeon, to look at the mouth of a boy about eight years old, who had had a severe attack of typhus fever. The poor little fellow was naturally lymphatic, and of a strumous habit; that though the fever had left him, he was represented to be in a dangerous state, from a grangrenous form of inflammation of the mouth, and from the swollen state of the face on one side, it was conjectured, that there existed a deep seated abscess, and that it extended from the center of the mouth to the coronoid process. When I first saw him, he appeared to be sinking from constant pain and inability to eat. The room was sickening to enter, from the fetid atmosphere, and on approaching the little sufferer, his breath caused us to experience a most painful nausea. However, I persisted on examining his mouth, and instead of an abscess, I observed the whole half of the lower jaw, from the symphysis of the maxillary bone to the coronoid process, completely denuded of the gum, and presenting well marked data to determine that the exposed bone was in a state of necrosis; and that the local inflammation and the extensive formation of pus, arose from an effort of nature, to throw off the dead substance. We differed, however, as to the stage of the process, as an opinion was offered, that it might be months before the separation could take place. But, as I did not rest satisfied with a mere ocular inspection, I felt the dead bone with my finger and thumb, and found that I could move the whole with the teeth in it. So, to

give myself less personal annoyance, and to expedite the process, I ordered the following lotion, aqua rosæ ℥ viij and xii drops of nitric acid, to be frequently injected with a syringe in the diseased part of the mouth. The next day I found the mouth much cleaner, and with comparatively little fetor, and perceiving that the diseased bone was only connected at its extreme posterior edge by a portion of gum resembling cartilage, I took a small curved instrument, (like a flattened tenaculum,) and easily separated the whole portion of jaw, a drawing of which is annexed.



a, *a*, half the lower jaw, from the symphysis; *b*, socket of the first permanent molar, which has fallen out, and has been lost; *c*, second temporary molar; *d*, alveolus of the first temporary molar; *e*, alveolus of the temporary cuspidatus; *f*, *f*, the alveoli of the permanent lateral and central incisors.

The boy rapidly recovered, and the loss of the bone was replaced by a hard cartilaginous substance, so that the face externally did not show any deformity; though, in speaking, the expression was not natural, as the buccinator muscle had become attached to the newly formed substance, so that the mouth looked awry when he spoke, yet the cure was complete, and with tonics and good diet, he ultimately regained better health than he had ever previously enjoyed.

The second case was also well marked, and is worthy of recording. Having had occasion to visit Gainsborough, in Lincolnshire, a small trading town, watered by the river Trent, and engaged in the corn and coasting trade, I was asked to see a little boy, the son of a captain and owner of a small craft. The little patient had had a rather severe attack of typhus fever, from which he had recovered, and that his life was endangered

by what appeared to be a case of cancrum-oris. The whole mouth had a gangrenous appearance. It was much swollen, and caused constant pain and inconvenience. I should mention that the town of Gainsborough, like Hull, is a damp, low place, and surrounded by a flat marshy country, having the river Trent on one of its sides, with long, narrow and confined streets, thickly inhabited, particularly in the vicinity of the river. The latter part mentioned, is very sickly, and often visited by contagious fevers and epidemic affections; during the time of the Asiatic cholera, the disease raged in this locality, and left many proofs of its ruthfulness. The subject, however, of this brief sketch, occupied a house in a more healthy part of the town, and from the circumstances of his parents, he had not suffered from any deficiency of diet, which is one of the predisposing causes of this form of the disease of the mouth.

He was a nice lad, about 8 or 9 years old, strongly made, and of a nervo-sanguinous temperament—he had a good and well formed head, and indicated great natural intelligence, and showed its influence by the fortitude with which he bore his constant suffering. On looking into his mouth, I perceived a portion of necrosed bone, with the teeth in it, being a portion of the lower jaw. It seemed loose and detached, and this was the result of his natural vigor of constitution and the active inflammation he had endured, which had effected the process of separation, and there was little trouble in removing the offending and extraneous body.

In this drawing it will be perceived that the destructive process was more circumscribed.

a, a, portion of the lower maxillary bone; *b,* the alveolus of the first permanent grinder; *c,* the first and second temporary molars in situ; *d, d,* the rudimentary crowns of the first and second bicuspids.

M—— E——, a girl about seven years old, residing in this town, was brought to me for my advice. She is the daughter of a jobbing shoemaker, or rather mender, who looks of a sickly, dirty yellow color, and her mother is a pale, weak looking, nervous person, who assisted in obtaining the small wants of her family by mangling: and as there happens to be about this case, incidentally, a great amount of interest, it seems not only worthy, but very important to be thus particularized. M—— E—— was herself, a short, pale-faced looking child, with a large head, having had, in all probability, during her infancy, hydrocephalus internus, but which had been cured. She could not stand, much less attempt to walk. The mother was therefore, obliged to carry her in her arms when she sought my advice. On looking into her mouth, I decided that the affection was much like cancrum oris. The gums, for example, had a gangrenous aspect, being livid and gorged with a dark purplish red colored blood, and the fetor extreme. Besides which, the gums had grown in such a preternatural manner, as to form a complete covering for every tooth; nay, hanging over them pendulous, enabling these flaps to be lifted up, sufficiently high to observe the dirty, yellow looking teeth they otherwise concealed. On the right side of both upper and lower jaws, there were abscesses, arising from a number of loose teeth, which were carious, and which presented sharp and angular edges to keep up a constant irritation—whilst the pus as it oozed out mixed with the saliva, which on being swallowed, kept up a constant nausea. I, therefore, removed all the loose teeth, and excised the superabundant portion of the diseased gums, and ordered the following lotion to be used three times a day.

Aqua rosæ, ℥ vij.
Argent. nitrat. gtt. xij.

When she was brought a second time, the mouth had acquired a comparatively healthy condition, and the child was free from pain. But I told Mrs. E——, (the mother,) that the gums would, in all probability, become bad again, as they were merely the outward and visible sign of constitutional debility.

So I gave her a note to a young German physician, requesting him to give the bearer his gratuitous services. I could not help smiling at the child's protest, "Pray sir, don't send me to a doctor, as I have taken a wagon load of physic." The sickly-faced mother also smiled at the energy of her afflicted girl, and said, "She has, indeed, had many doctors." But she could not stand, nor had she been able to make the attempt for some time past. My German friend declined the case, as he despaired of curing her after so many had failed. The poor woman returned to tell, with a countenance expressive of despair. Prompted by humanity, I examined the spine, and found the second and third lumbar vertebræ forced outwards, resembling a bony excrescence. As I felt assured the child had worms, I urged her to try a simple German remedy, namely, to take a modern sized silver tea-spoonful of common salt, (the chloride of sodium,) in a tumbler of tepid water, an hour before rising in the morning. My advice was given on Friday, and on the following Monday, Mrs. E—— came to tell me, with tears rolling down her cheeks, that her poor invalid had voided three pints of worms. I recommended to continue the same treatment for some weeks, and to place her child on a hard mattress, with a padding under her, to press on the protruded bones, and soon the latter assumed their proper place, and I had the pleasure of seeing the little dwarfish, intelligent child, walk down to my house to thank me.

In this case we have indubitable evidence of the intimate connection of the teeth with the mucous tissues: as the intestinal irritation had induced extensive irritation in the buccal cavity, involving the organs of the mouth in general, and of the gums in particular; hence, teaching a most important lesson, viz. that in forming a diagnosis, we should endeaver to obtain from the patient something of his or her previous history. For, otherwise, grave errors may be committed in practice. If, for instance, a medical man should always pronounce every case as cancrum oris where the gums were enlarged and gangrenous, and the alveoli exposed, to be the sequala of exanthematous diseases, he would in all such cases (as the one now recorded)

fail to cure. Where, however, the cause is local, as in the two previously described cases, the cures were perfect, and the previous disturbance to the health (induced by the inflammation of the mouth) presented all the testimony of cause and effect. But this would not have been the case with M—— E——. The relief afforded by the removal of the carious teeth and morbidly increased gums, would only have been temporary in its consequences: for whilst the lower bowels were loaded with worms, the mere local habitation, they would have been highly irritative to the mucous surfaces, and this irritation would have again affected the mouth, it being a mere extension or continuation of its surface, and the poor child would have most likely had a repetition of the symptoms for which I was first consulted. Lastly, her stunted growth of body, evidently too short for her large head, and the weakness of the lower extremities, seem to warrant the conclusion, *a priori*, that the functions of the spinal nerves were greatly interfered with, and all the chylopoietic viscera (particularly the liver) more or less imperfectly performing their functions from hereditary influences.

ARTICLE XI.

Adjusting Forcep. By G. F. J. Colburn, Newark, N. J.

In the spring of 1848, I had made for me, by a cutler of this city, and recently by Mr. George Tieman, of New York, a forcep, to which I have given the above name. It differs from those in common use, by being so constructed that the inside beam of the instrument can be lengthened, making one beak longer than the other; the object of which is, to enable the operator to grasp a tooth or root that has the inside or outside wall broken or decayed below the line of the gum, by adjusting

the beaks of the forcep, so that both are brought to bear on the firm bone, as is shown in figures 1 and 2.

Fig. 1

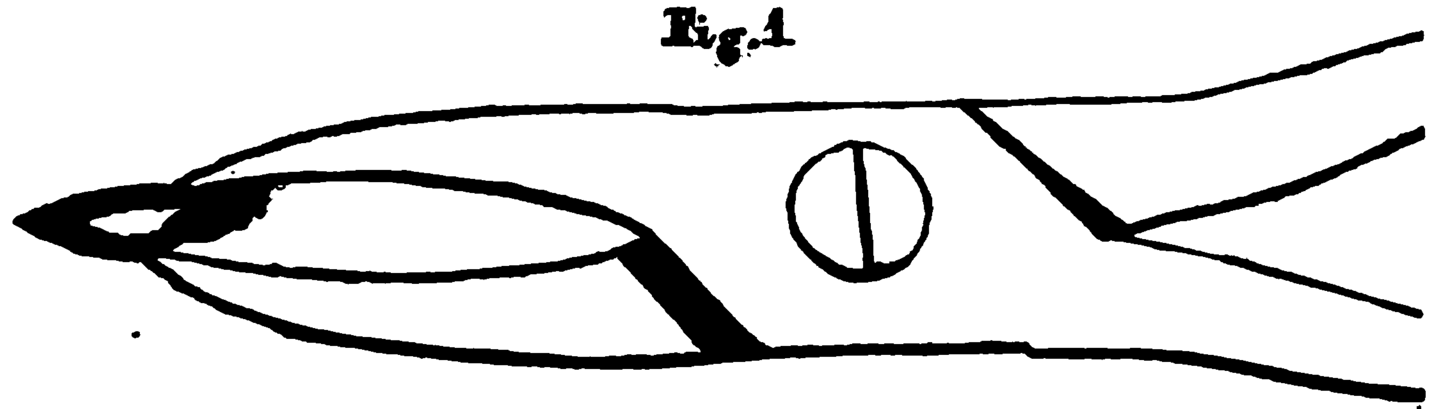
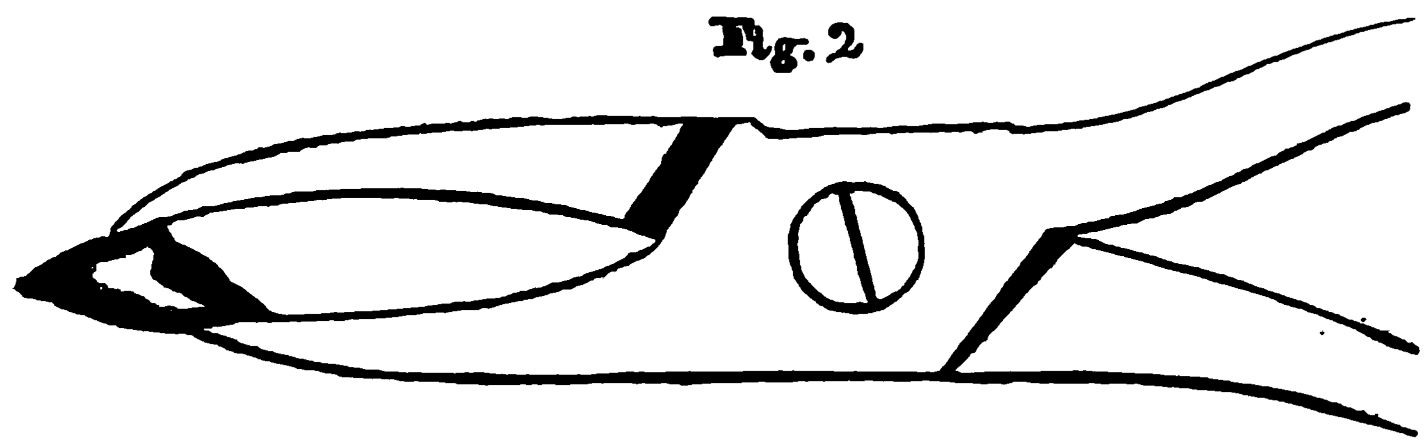
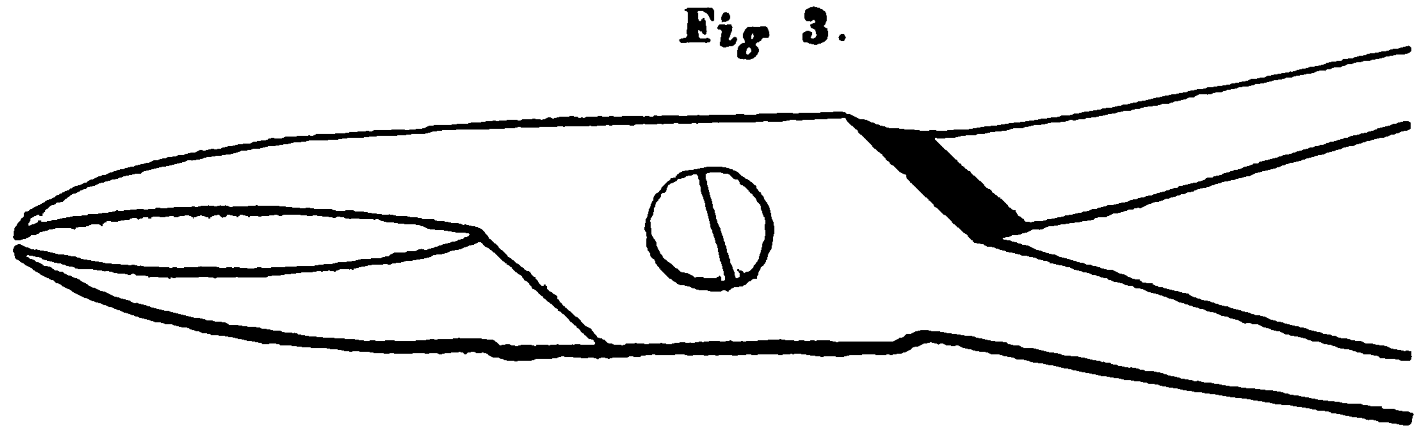


Fig. 2



The beak is adjusted by turning the head of the rivet (which is left large for this purpose) and removing it, then pushing up the inside beam, which has a notch cut out of it, at the junction of the handles and joint, until the second hole is ready for the rivet, which put in its place, the inside beam is now so elongated, that the beak will reach the firm bone beyond the decay. By reversing the instrument, the same beak will answer for the outside, or both beaks can be made of equal length, as in the common forcep.

Fig 3.



The one instrument combining the uses and advantages of three separate ones. This forcep will be found to be the most useful in the extraction of incisors and bicuspids. It can be used with or without Dr. Hullihen's improvement.

The difference in its construction from the forcep in general use, is, simply having two holes instead of one, in the joint part of the inside beam for the rivet, and a notch cut out of the beam at the juncture of the handle and joint, sufficient to give the beak the required length, the small end of the rivet has a thread cut on it and a corresponding one in the rivet hole of the other joint, for the purpose of retaining the rivet when screwed in, the other end of the rivet has a large head, so that it may be readily turned with the thumb and finger. I have used this forcep for nearly three years, and it has answered so good a purpose in lessening the embarrassment in extracting teeth, that I deem it my duty to lay it before the profession.

SELECTED ARTICLES.

ARTICLE XII.

New Preparations of Gold for Stopping Carious Teeth. By JOHN TOMES, F. R. S., Surgeon Dentist to the Middlesex Hospital.

If the various operations performed by the dentist were compared, with a view to ascertain the relative value of each, it is probable that the stopping of carious teeth would be placed first on the list. A tooth skilfully plugged under favorable circumstances, is, in point of durability and usefulness, scarcely inferior to one that has not been stopped, or to the tooth had it not been attacked with caries, and needed plugging. Indeed, a tooth which has been well plugged before disease had too far reduced its substance, is in effect restored to the condition of a sound and healthy organ.

If inquiry be made of those who have been accustomed to attend to their teeth, and are somewhat advanced in years, many

instances may be found of teeth which have been stopped twenty, thirty, and even forty years; but teeth which began to decay, and yet have remained useful for such lengthened periods without having been plugged, will not be found.

The knowledge of these facts has for many years past led dentists to pay great attention both to the performance of the operation, and to the material most suitable for stopping teeth; and the results of individual experience have been from time to time published.

It may, I think, be safely said that all experienced dentists regard gold as by far the best material for filling teeth, and deprecate the use of any substitute when that metal can be effectively used.

The gold has been used in the form of foil reduced from plate by hammering to suitable degrees of thickness; and in the preparation of this, great care and expense have been bestowed. The superiority of gold over all other substances has for a long time been acknowledged; but there are many difficulties in its use, and these require considerable practice and skill to overcome. The gold may be good, and the case favorable; yet, in the absence of dexterity in the operator, the filling may be, and frequently is, defective. Neither will this appear astonishing when the conditions which constitute a good plug are considered in connection with the position of the teeth, and the parts of these which may require plugging. A perfectly successful plug is a solid mass of gold, fitting perfectly the cavity in the faulty tooth. Hitherto, gold foil has alone been used. This is introduced into the cavity in various forms—in long strips folded up and down from the top to the bottom of the cavity; in small masses, introduced one after the other; or in small carefully-made cylinders. Whichever method is practised, great care is taken to press the gold against the sides of the cavity in the process of filling, as pressure on the surface of the plug condenses the gold only for a very short distance below the surface. If, for instance, the masticating surface of a molar tooth which has a large hole in it be plugged with gold foil, forced in from the surface, and pressed only towards the bottom

of the cavity, it will be found, on removing the tooth, that the gold near the surface has been compressed into a hard scale, while that occupying the bottom of the cavity is porous, and admits of further compression. Hence it has been found necessary to pack in gold, and in the steps of the process to compress it against the sides of the cavity. When the cavity has been in this manner filled, wedge-shape instruments are forced into the gold, and as room is thus made, more of the metal is added, until the instrument can no longer be made to enter the plug. Then the surface of the plug is compressed forcibly with the plugging instrument, the superfluous gold is filed away, and the surface of the plug burnished. Now, if the operation has been conducted in the best possible manner, and the gold used unexceptionable, the plug will be a perfectly solid mass; the foil will have become cold welded. This result has been obtained, and is, perhaps, not very unfrequently obtained by most good operators; but the result would be much more constant if the gold foil having the welding property could at all times be obtained, and the cavities of diseased teeth were favorably situated for applying the requisite amount of compression. We cannot, however, choose the situation of the cavities; we must treat them in whatever position they occur. But something can be, and, I believe, I may safely say has been done towards the improvement in gold. A gold has been produced, which, under the pressure of the plugging instrument, welds with the greatest readiness into a solid mass capable of being rolled into plates or drawn into wire.

Platinum is obtained in a spongy condition, is heated, and then compressed in a solid mass; it, in fact, welds as wrought iron does when hammered at a white or welding heat, as it is called. The new preparation of gold may, with propriety, be called spongy gold, from its close resemblance as regards condition, to spongy platinum. But the gold welds under pressure without the aid of heat.

In 1825, Mr. Caudius Ash obtained a precipitate of gold by using copper, which he thought would do for stopping teeth. He tried it, and did not find that it answered his expectation.

The idea was abandoned without further effort. Had he continued his experiments, it is probable he might have obtained a result which would have encouraged him to proceed; and, judging from the success which has attended his untiring efforts in the improvement of mineral teeth, it can scarcely be doubted but that he would have produced a gold similar to that which has recently been presented.

Some months since, a Parisian dentist, on his return through London from a visit to America, brought with him two or three teeth plugged with spongy gold. He called on several dentists—myself amongst the number—and exhibited the stopped teeth. This gentleman also called on Mr. Ash, and offered to sell him the secret of preparing the gold, with directions for its use, both of which he had learned in America. While negotiations were going on, the method of preparation was sold to a dentist for a large sum, and the conditions of sale were considerably raised to Mr. Ash, who then declined the offer.

The purchaser, I am told, found that the gold prepared in accordance with the directions he received did not at all answer his expectations, and he (for the time) abandoned the idea of using it. Mr. Ash, however, recollecting his former experiment, again commenced to work on the subject, and succeeded in producing a preparation of gold which readily welded. Of this he sent me half an ounce. It consisted of a fine brown powder, and of small masses, which readily broke down into powder when pressed lightly. Under the microscope, the powder was seen to consist of minute particles of bright metallic gold, in the form of irregular crystals or nodules. Under pressure, these minute particles readily unite into a solid mass. Several teeth were plugged, by introducing small balls of the powder and compressing it from the exposed surface of the plug. The results seemed highly satisfactory; but on removing the plug it was found that the welding extended but a short distance from the surface against which the instrument was applied, while the lower part of the plug remained porous, and maintained the brown color of the powder. This condition indicated a serious imperfection in the method of using the

metal, and other plans were tried: teeth were partially filled with the powder, and this was condensed by forcing it towards the circumference of the cavity, thereby forming a solid ring; more powder was then added, and the plug completed. By these means a perfectly solid plug was formed, to which no objection could be made. In practice, however, the use of the powder was attended with considerable difficulty, even though introduced into the teeth in lumps, in consequence of the great waste. More or less constantly escaped into the mouth before its condensation could be effected. In stopping teeth in the upper jaw the waste was very great. It occurred to me that this difficulty could be overcome by wrapping the gold in foil. This experiment was tried, and the result equalled my expectation. By this method I succeeded in making very perfect plugs, which, when removed, presented a solid uniform mass of metal, perfectly welded, and free from pores.

Still the gold seems to admit of improvement—in fact, requires to be produced in the shape of a sponge instead of a powder, so that the present difficulties of manipulation might be overcome, and the use of gold foil rendered needless.

In the *American Journal of Dental Science* for October 1850, the following editorial notice will be found:—"*A new preparation of gold for filling teeth.*—Within the last few weeks several dentists in New York have tested the value of sponge gold, as a substitute for gold foil, for filling teeth; but to what conclusion they have arrived with regard to it we have not been able to ascertain. We have been informed, however, that some are disposed to think very favorably of it.

"The preparation is of a reddish brown color, and readily crumbles into a fine powder on being rubbed; but, on being pressed together, it at once becomes a compact mass. A few weeks ago we received from the manufacturer, Dr. Maire, through Dr. G. E. Hawes of New York, a small quantity of it, with a request that we would try it. This we have done; but our experiments have been too limited to enable us to say much with regard to its value. We tried it in the cavity of a dead tooth out of the mouth, and succeeded in making a very solid

filling. The surface assumed the color of gold, and presented a highly polished and beautiful appearance; but, on removing it from the tooth, we found that every other part retained the reddish brown color of the sponge, with here and there the lustre of a particle of gold. For front teeth this would constitute an insuperable objection. On breaking it, the fractured surfaces had the same appearance. We have also seen two incisors that were filled with it, which were correspondingly discolored.

"It may, perhaps, answer a very good purpose for filling the grinding surface of a molar tooth; but, as it crumbles into powder so readily, we should not think it could be employed for filling a small cavity in the approximal surface of any tooth where the aperture between it and the adjoining organ was very narrow. It is possible, however, that some may have discovered a method of introducing it into the cavity of a tooth of which we are ignorant; and, as our experiments with it have been very limited, we would be glad if some of our brethren of New York, who have given it a thorough trial, would favor us with their opinion with regard to its value."

The gold here described is probably similar to that prepared by Mr. Ash; but, either from the manner of plugging, or from the quality of the gold, the results seem to have been less satisfactory than those I have obtained. The two subsequent numbers of the Journal contain no further information on the subject.

Mr. George, in conversation, told me that he had prepared some spongy gold by making a plate largely alloyed with silver, and then dissolving out the latter metal with nitric acid. In the first experiment he succeeded in producing a gold which formed a good plug; but, in several subsequent trials, he had failed to obtain a similar result.

Some years since, I read an account of precipitating gold from its solution by oxalic acid; and on trying the experiment, found that part of the gold was thrown down in a thin sheet. It did not occur to me at the time to use this for stopping teeth; but when the spongy gold was talked of, the experiment re-

curred to me, and I mentioned the circumstance to my friend Mr. Makins of Kingston, and also showed him the results obtained by Mr. Ash. Mr. Makins and myself were students together at King's College, and colleagues at Middlesex Hospital, he having a short time since held the chemical chair in the school attached to that institution. I knew that, since his retirement from the lectureship, Mr. Makins had been working in metals. At my request he at once undertook to make some researches on the forms in which gold could be obtained, and the results have been most satisfactory.

Mr. Makins has obtained a soft and malleable gold in two forms—one a thin léaf, another a soft compressible sponge.

The leaf has a frosted appearance, which a microscopic examination shows to arise from the surface being minutely nodulated with here and there irregular, imperfect, crystalline columns, arising to a considerable height from the surface of the leaf. If two of these leaves are pressed together, even with an ivory paper-knife, they cannot be again separated. This gold, introduced into a small cavity, condenses under moderate pressure into a most perfect plug; but, if the cavity be large, it must be introduced in small pieces, and each one compressed before introducing another, much in the same way as in using gold foil, excepting that much less care is required as regards the packing and the direction of the folds of the metal; for, with moderate care, the whole may be welded into a compact uniform mass.

The sponge is revealed by the microscope to be a porous mass of bright metallic gold. It may be compressed by the thumb and finger to a third of its bulk, or may be torn into small pieces without exhibiting any tendency to fall into powder. The smaller pieces may again be united into a mass by simply pressing them together in the hand. These are advantages which no other form of gold possesses.

The sponge, if the bulk be not too great, condenses into a compact solid mass, when pressed into the cavity of a tooth with the ordinary plugging instruments, and presents a bright burnished surface where the steel instrument has come in con-

tact with it, and a hard frosted surface when it lies in contact with the surface of the cavity. If the plug be sawn through, the interior will be found to be compact, and the angles formed by dividing a cylindrical mass will be found to be sharp and hard. Such a plug made with gold foil may present a similar appearance; but, commonly, the angles will be much less firm, and the plug will fall into several pieces, corresponding to the portions of foil which were separately introduced.

In estimating the relative value of the new forms of gold for stopping teeth, as compared with the gold foil in common use, it must be remembered, that the latter has a smooth, more or less burnished surface; that such surfaces weld with difficulty while the former have nodulated surfaces which have not been burnished or subject to pressure, and that they weld readily; that the foil requires very careful packing, both as regards the position of the folds and their size; while the new gold, from the readiness with which it welds, needs no such care.

The properties of the new and old forms of gold may be shown by taking an equal mass of each, and, with a plugging instrument, pressing them upon the surface of a six-pence. Each will assume the form of a plate; but the foil will break up into small fragments and layers when bent and pressed with the finger nail; while the sponge and leaf will present a hard rigid mass, which with force may be broken, but it will not fall into small fragments or break up into layers. Again, if the surfaces of two pieces of the new gold which have been pressed against the coin, be placed in contact, and firmly pressed together, they will adhere—a condition which will not be found to obtain with the pieces of gold foil similarly treated. If the surfaces of the plates of the new gold are highly burnished with the stopping instrument, and are then pressed together, they will adhere, but very imperfectly, if at all.

In giving directions for using the new forms of gold, it will be unnecessary to urge the absolute necessity of removing all the softer dentine from the cavity of the tooth to be plugged, and to again state what should be the form of the cavity for receiving the gold, as these points have been fully dwelt on by many wri-

ters, and by myself, when treating on plugging teeth, in my Lectures on Dental Physiology and Surgery; for the form of cavity should be similar, whatever kind of gold be used: it should approach a cylinder as nearly as is practicable; and overhanging edges of enamel should, if possible, be removed.

If the cavity be of moderate size, and shallow, (for instance not more than the sixteenth of an inch in depth,) sufficient sponge gold for completing the plug may be taken, and pressed with a plugging instrument into the cavity; it should then be gradually worked round the circumference of the cavity, with an instrument having a small extremity. At first the pressure should be light, but afterwards it should be increased till the plug is consolidated. At this stage of the operation, the plug (if sufficient of the sponge has been taken) will project above the orifice of the cavity. The surface may now be cut or filed away, and the plugging instrument again used. The gold will probably sink a little under the reapplication of the instrument, in consequence of the removal of the surface, which had become so hard that the pressure had not operated through it. The greater hardness of the surface would seem to indicate that the plug is imperfect, from the unequal density in the different parts. It is not so, however. If a piece of brass (or any other metal, indeed) be hammered, it will, in working, be found to be harder near the hammered surface than in the interior. Yet the interior will be harder than if the brass had not been hammered, and it will be hard enough. So with a gold plug, if the surface is the hardest, yet the interior will be hard enough, and to the eye will be perfectly compact. Indeed, the hardest part is in the best position—that exposed to wear. If the cavity be double the depth I have described, then take half as much of the spongy metal as would serve for its completion, and thoroughly compress it, but with as little burnishing of the surface as possible. The cavity will then be in the position of the one I first described, and may be treated in the subsequent stage of the operation similarly. By adopting this plan a more solid plug is gained, than if a sufficient quantity of gold for completing the operation had been intro-

duced at once. This method would not be very effective with gold foil, but with the sponge the welding is so perfect, that there is no chance of the upper part coming out or crumbling to pieces; indeed, it is exceedingly difficult to get a plug made with sponge gold out of its cavity, unless by drilling. In this respect it resembles a plug made with amalgam.

If the cavity be broad and shallow, the further side may be first filled by pressing the gold in that direction, before too much pressure has been applied on the surface of the plug. When the further half has been filled, and vertical wall of gold left, the other half may be filled. The two halves of the plug will weld, if in making the wall of the first half, the surface has not been burnished.

An equally good plug may be made, by introducing a mass of gold sponge, and after compressing it moderately, making a hole in the center, and from this, compressing the stopping towards the walls of the cavity. By this method the cavity becomes lined with a cup of solid metal, the center of which can be readily filled, and the plug made sound.

In large angular cavities, such as are sometimes found in the molar teeth, more especially in those of the lower jaw, a good plug may be made by forcing the gold into the angles; thus reducing the cavity to a cylindrical one. The bottom may then be filled to within the tenth of an inch of the surface, and the remaining part completed. With gold foil, the filling the angles of a cavity is often troublesome, but with spongy gold it is an easy matter.

When the compressing instrument ceases to take effect, in fact, when no further consolidation of the metal can be effected —the plug should project above the edges of the cavity, so, that when the surface has been cut or filed away, and further compression is attempted, the plug may not sink below the margins of the cavity.

A sharp wedge-shaped instrument should at this period of the operation be used, and if any parts are found which can be pierced, these should be filled with a little of the leaf gold.

In finishing, all the tool-marks should be removed, the mar-

gin of the plug made perfectly level with the surrounding part of the tooth, and with the centre a little elevated. It should, lastly, be brightly burnished.

In using the new forms of gold, it is desirable to bear in mind, that the surfaces of the metal should be handled as little as possible, otherwise, they will become coated with extraneous matter, which will interfere with the welding. Neither should the stock of gold be exposed to the atmosphere. It may be conveniently kept in a wide mouth bottle, which admits of being well corked. Should, however, the metal lose its softness or its welding properties, it may be restored to its former condition by annealing over a spirit lamp.

In selecting the gold for making a plug, I have usually employed the sponge for filling the cavity, and the leaf for stopping the cavity made by the wedging instrument in the partially completed plug.

The two kinds of gold manufactured by Mr. Makins, may, I believe, be obtained of Mr. Ash of Broad-street, Golden-square; and I would urge upon dentists, the expediency of giving them a fair trial. At present but little has been made; it is, therefore, probable, that with further experience, many improvements in the condition of the gold may be made. But should it be shown that better spongy and leaf gold cannot be produced than that with which Mr. Makins has supplied me, even then, I think, there is great cause for congratulation, for I believe it will be found that better plugs can be made with these forms, than can, on the average, be made with the gold foil prepared by hammering in the usual manner.—*Med. Gaz.*

ARTICLE XIII.

An Instrument for Applying Electric Heat in Dental Operations. By George Waite, M. R. C. S., Surgeon-Dentist.

Hydrocyanic acid, as also the acetate of morphia, and strong acids, have for many years been used in dental surgery to deaden pain in teeth, but all these applications have been open to many objections.

"A conversation with the late Mr. Murphy of King's College, Cambridge, (says Mr. Waite,) suggested to me the use of electricity in dental surgery; his words, as near as I can remember, were as follows:—'The day will come when electric heat will be used in surgery, and also for many purposes in domestic arrangements.'

"The idea remained a secret with me till last year, when I communicated it to Mr. Redwood, and also to some other scientific friends, and they all appeared pleased with its simplicity and novelty.

"Early in the autumn, Mr. Laxton of Fludyer-street, entered a caveat for me at the patent office, to prevent other parties patenting the invention, although I had no idea of doing so. Considering then my plan no longer a secret, I communicated it to many friends, who expressed themselves so much pleased with it, that having obtained space at the Exposition, I forwarded a drawing of it to the illustrated catalogue of the Great Exhibition. But not to intrude too much on your valuable space, I will state, that for the purpose I use a Grove's battery with eight cells. When using it, I have in my hand a holder with two copper wires passing through it, one positive from the battery, and the other terminating in a groove in the holder and fastened to a spring, by which I make or break contact at will with the negative wire. To the further end of the two wires a thin platinum wire is connected, and on the battery being charged and contact made, this takes suddenly the electric heat.

"The efficacy and simplicity of the process being so decided, I am enabled to use it for many purposes, viz. to evaporate quicksilver from cements, and render them much less injurious to teeth than they otherwise would be; also, where too great sensitiveness exists, and which prevents the operator from removing the caries; where gums have receded and left the necks of teeth highly sensitive to the touch; where teeth are affected by mollities which cannot by other means be combated; where teeth have to be pivoted, and when vitality remaining in the root would subject the patient to serious inflammation; where teeth have been broken, or cut, or filed, and left sensitive to cold and warmth; where violent tooth-ache exists; where hemorrhages come on, or slight bleeding into the cavity, preventing a continuance of any operation.

"The electric heat retains its force differently to all other heat which can be applied to the mouth; the platinum wire can be placed, without the patient being aware of it, near the part affected, heat can be produced almost momentarily, and suddenly deadened, and as a most interesting phenomenon, and one which has surprised me very much, in patients of a highly nervous temperament where I have expected much suffering, none has been endured on its application. It would be superfluous here to detail many interesting facts which the use of electric heat will discover to the scientific dentist; these, philosophy explains with the laws of the sensitive faculty. It is my sincere hope that operators will be judicious in the use of this agent, and not bring it into disrepute by ill-judged and ill-timed applications.

"In many cases it will be found equally efficacious when holding it near the teeth, as if they were touched by it.

"Care must be taken not to continue its application too long, as it will burn up and blacken the part it touches.

"As time passes on, I look forward to its use being generally understood, and it will then give rise to many improvements tending to the benefit of society."

This plate represents the electro-dental apparatus ready for use. *A* Grove's battery; *a*, an ivory-holder pierced with two grooves, one of them open at the end; *B*, the copper wires, one terminating at *b*; *C*, the platinum point; *D*, a spring to make contact with the wire which terminates at *b*; *E*, a mouth piece unscrewing at *F*, and in which the platinum and copper wires are connected.—*London Lancet.*

ARTICLE XIV.

On the Destruction of the Dental Pulp by the Heat of Electricity. By Thomas H. Harding, Esq.

It may be confidently stated, that a more rapid, certain, and safe method of destroying the sensitive pulp of a decayed tooth, than any with which dentists are already familiar, will be regarded as a great advantage by all engaged in the practice of dental surgery. Having read in your journal an abstract of a paper communicated to the Medico-Chirurgical Society by Mr. Marshall, giving an account of his method of employing the heat of electricity for the purpose of limited cauterization in surgical disease, and a subsequent report of several operations performed by him, it struck me that a platina wire, heated in

the way he recommends, might be made available for the instantaneous destruction of an exposed tooth-pulp.

On communicating this idea to Mr. Marshall, I found that it had already occurred to himself, and had been mentioned by him as one obvious application of his method of operating with the electric heat. Moreover, his experience in the matter enabled him to suggest for the purpose a very simple and suitable apparatus, which is, in fact, a reduced copy of that which he had used so successfully in other cases, and in which the cauterizing portion consists of a flattened *loop* of fine platina wire.

The apparatus as ultimately employed by me may be thus described:—The battery, which of course may vary according to the choice of the operator, but which it is so desirable to render as elegant and simple in arrangement as possible, is constructed on a plan similar to that of the larger battery now employed by Mr. Marshall, which I believe he shortly intends to describe. It consists of only two pairs of plates, contained in a single cell, and is set in action by one fluid—viz. dilute sulphuric acid. The terminal six inches of the poles, which are of copper wire, plated, are supported on an ebony or ivory handle, upon the side of which one of the poles is interrupted at a particular point. The extremities of the poles are connected by a piece of platina wire, one-hundredth of an inch thick and three-quarters of an inch long, which is bent into a *loop*. The sides of this loop are then brought parallel and nearly close to each other without touching, and it is thus introduced into the pulp cavity of the tooth to be operated on. By a slight pressure on one side of the handle, the interrupted pole is temporarily joined, and the platina wire immediately becomes brilliantly heated as it lies in contact with the tooth-pulp. Sometimes, however, I have found it desirable, in the first place, to complete the galvanic circuit, and thus heat the platina wire, before bringing it to bear upon the exposed pulp. The flexibility of the loop of wire enables the operator to bend it in any direction previously to use. In this way I have succeeded in rapidly destroying the pulps of decayed and condemned teeth and have proceeded, after a few minutes, to the

operation of filling with gold or with Ash's metallic paste. I have also destroyed, with the greatest ease and rapidity, the pulps of incisor teeth, cut off for the purpose of being pivoted.

It is obvious that this method is applicable either for the simple cure of tooth-ache, or as a preliminary step to the operation of filling. I am aware that there is nothing novel in the use of a hot wire for destroying the nerve of an aching tooth. The old village doctoress has long ago cured tooth-ache by the thrust of a hot needle or pin, and dentists occasionally use a heated wire. But the difficulty has been felt of applying the wire easily, and at a duly elevated temperature. In the method just described, this is surely, readily, and instantaneously accomplished. The vitality of the tooth-pulp is thoroughly destroyed, and it is even so far consumed or carbonized that the operations of filling or pivoting may be at once proceeded with, instead of having to be delayed. Owing to the extreme fineness of the wire employed, the local heat, though intense, is very limited in its action, and with due care the tooth substance need not suffer any appreciable injury. It may also be remarked, that in operating on some teeth, I have found, by completing the galvanic circuit on approaching the tooth, that the light given out by the incandescent wire aids very remarkably in giving a perfect view of the exact point at which the tooth-pulp is exposed.

In conclusion, I can only say, I beg confidently to lay this method before the notice of the profession, as the most ingenious and simple contrivance yet invented for the object in view, and as one which I think will be very generally adopted. It will give me great pleasure to exhibit the apparatus and the mode of operating to any who are interested about it; and I may add that the apparatus itself will be constructed by Mr. Coxeter, of Grafton-street East.

ARTICLE XV.

On Teething. From a Treatise on the Teeth. By Mr. A. Canton.

The process of teething, as the eruption of the temporary and permanent set of teeth is termed, is one of the utmost interest and importance to the medical attendant, the anxious parent, and to the child itself. In very many instances it unfortunately happens, that the absorption of the gum, and dental sac, set up by the onward progress of the advancing tooth, excites great irritation and fever in the animal economy, which not unfrequently settles in some one or other of the more important organs of the body, and induces disease, which, if not speedily combated by the resources of the medical art, may either lead to permanent and irretrievable mischief, or to the absolute destruction of life. It behooves, then, all who are interested in the welfare of children, to watch carefully at this period of their infantile existence for the signs and evidences of commencing irritation in any part of the system, and as soon as they appear, however trifling they may be, more especially if there be heat and swelling of the gums, with the other symptoms of approaching teething, at once to seek for that medical assistance, by which alone, the impending mischief may be warded off.

We have already given a brief sketch of the development of the teeth, during the period the embryo is carried in the mother's womb, and have brought up our remarks to the time prior to dentition. The teeth continue to grow after the birth of the child, until, in the average of instances, the crown in full growth makes its appearance externally, having caused, by the pressure it exerts, the removal of all the parts lying over it. The fang is not complete until after the crown of the tooth has presented itself above the level of the gum. Before this occurs, certain changes take place in the gums, which indicate to the experienced eye and finger, that nature is urging forward the

eruption of a tooth. The gum becomes broader, swollen, hot, and tender; the child is constantly dribbling, and is never easy unless it has a finger, or some substance in its mouth, to press upon the inflamed gum. Much pressure, however, causes a fit of crying, and the little sufferer frequently, in addition, presents signs of general irritation and irritability. It is fretful, frequently crying, and is pacified with difficulty; the cheeks are flushed, sleep restless and disturbed, and the stomach and bowels are more or less disorded. In some instances, however, the teeth are cut with little or no disturbance of the health, and almost the first indication given that the process of dentition has been going on, is the appearance of the tooth above the level of the gum.

The first teeth of the temporary set are cut in general about the sixth, seventh, or eighth month of infantile life; these are the central incisors of the lower jaw, and they are followed in the course of a week or two by the same teeth in the upper jaw. It should be fully understood, however, that in stating the sixth, seventh, or eighth month, as the period when these teeth are first seen in the mouth, the average is taken of the process of teething in healthy children. Teeth have been cut much earlier, and again the process has been delayed till the tenth, and even the twelfth month, the time of their appearance varying greatly in different children, owing to the state of their health, their freedom from disease, hereditary or acquired, the strength of their constitution, &c. Again some children cut their teeth across, as it is termed, that is to say, certain teeth appear above the gum in an order different to that usually met with; the canine perhaps before the incisors, and certain of the molar teeth are found to be making their way most irregularly.

In the usual course of nature, however, the central incisors of the lower jaw are cut about the time already stated, and their appearance is followed some days afterwards by that of the corresponding teeth in the upper jaw. The lateral incisors of the upper jaw next make their way; this occurs about the tenth or eleventh month, and those of the lower jaw soon follow. A month or two after these, we have the anterior molars of the

lower jaw piercing through the gum, and soon after those of the superior maxilla. The canines next appear, and lastly the second milk molars, between the age of two years and two and a half.

The irregularities so often encountered among the permanent teeth, are rarely met with in the temporary, either as regards position, number, form, or date of eruption. The well known, but somewhat apocryphal tale respecting Richard III, has, however, had its parallel of late date. Tomes mentions a child, five weeks old, whose mother complained that itwas born with two teeth in the lower jaw, by which her breast, and its own upper jaw, had been injured. On examination, he found two sharp-edged, rough-surfaced incisor teeth sticking up from the center of the lower jaw. They were ill-shaped, imperfectly coated with enamel, and loose in the gum, and stood across, instead of in a line with the alveolar arch. These were removed, and it was found that the fangs were not more than one-third developed. In fact, the teeth had attained about the normal amount of development for the age of the child, but had been protruded through the gums before they were fitted for eruption. An after-process had been effected before the preparatory one had been completed. A similar case has occurred in my own practice.

Dr. Brown, an American physician, mentions a still more extraordinary example, which he published in the *American Journal of Dental Surgery*. A child was born with the central incisors through the gums. They were extracted. Two other children were afterwards born of the same mother, in each of whom the same singular anomaly was found. Their teeth were allowed to remain. In each case the children were females. Dr. Crump, another American physician, reports a case of full dentition, at birth, in a still-born negro child. The sockets were very imperfectly formed. Dr. Lethbridge, it is said, has met with a similar instance.

Imperfections in dentition are of occasional occurrence. Sometimes the central incisors are absent altogether; in others again, even when the child has attained its sixth year, it may

have a few front teeth only. Two cases have been recorded in which the persons reached old age, without even cutting a tooth. In a case exhibited by Dr. Brinton at the Pathological Society, the alveolar processes of the upper jaw-bones were wanting, but the canine teeth were present on each side, lying parallel to the maxilla. I myself examined a child, whose mouth was apparently well formed. Nevertheless I detected the absence of the right canine tooth of the lower jaw during the first dentition. This was a deficiency that a dentist or a surgeon only could detect, as the jaw appeared to possess its full complement of teeth, there not being any vacancy in the place where the canine should have been found. As I looked upon this as an interesting specimen of dental pathology, I made a model of the mouth, which is now in the possession of my friend, Mr. Tomes.

It has been already stated that the irritation caused by the process of dentition will, in many children, induce disorder, and even permanent disease of other, and important, organs of the body. The first signs indicative of the commencement of that process are mostly attended by fever, and general disorder of the system. The child is irritable and fretful; the skin hot and dry; the bowels disordered; the scalp hot; the eyes heavy and dull, or preternaturally bright; the mouth slavers, the gums are swollen, broader, and more red than usual, hot and painful to the touch: the appetite is lost; the little patient taking the breast by fits and starts, and speedily losing its hold of the nipple. The bowels are generally disordered, the stools being relaxed, and often of a pale, pasty appearance, or green, or clay-colored. Frequent purging, with griping pain, is not an uncommon concomitant of dentition. The head, however, may be the part that sympathises most during teething; when the irritation has been continued for some little time, or even very early during the attack, the infant may be seized with convulsive fits, recurring often with great rapidity, and ending not unfrequently in death, if the appropriate preventive, and remedial measures, be not adopted. A less severe form of disorder, thus induced, may, however, attend on this cause of irritation; eruptions on the scalp, cutaneous inflammations,

and discharge from behind the ears, inflammation of the eyes, &c., all in childhood owe their origin at times to the concomitant disorder of dentition. Water on the brain and epilepsy, generally of a temporary, but sometimes of a permanent character, may be thus excited. Again, palsy, affecting one or more limbs, may be induced, and may become permanent, or even prove the precursor to a fatal termination.

On this point, Dr. Henry Davies, late of Saville-row, Physician to the British Lying-in Hospital, and now of Brighton, has added his testimony in proof of the very serious diseases which are sometimes set up in consequence of dentition. In a communication which he addressed to the Medical and Chirurgical Society, he describes the case of a female infant, rather more than a year old, who had cut two lower teeth well; but who one day, having been previously very lively, and having taken her usual exercise in the baby-jumper, and been put to bed apparently well, soon after became restless, and slightly shivering. Early the next morning, she uttered a peculiar cry, and the nurse gave her some Dalby's carminative. This not affording any relief, she was put into a warm bath, and had a dose of castor oil. A few hours after, she was violently sick, turned cold, and looked blue about the mouth, nose, and eyes. She was then put into a warm bath again, when she appeared to lose the entire use of her limbs, and her countenance became vacant. Dr. Davies did not see her till the evening of the second day—much valuable time being thus lost. She was perfectly conscious; head cool, and the temperature of the surface generally natural, the pupils contracting under the influence of light: pulse moderately frequent, small and languid: tongue slightly coated. The upper extremities were devoid of all power of motion, or sensation, even from pinching or pricking with a pin; but the lower extremities were drawn up, on her feet being tickled. Nothing unnatural could be detected in the spine or elsewhere. Leeches had been applied behind the ears; a blister was placed between the shoulders, and aperients, &c., were administered. During the five weeks that the child lived, no change took place in the paralytic symp-

toms, and she remained conscious to within a few hours of death. During this time she cut six teeth. The appearances after death showed some degree of determination of blood to the brain, which, with the upper part of the spinal marrow, was peculiarly firm. There was an ounce and a half of sanguineous fluid covering the surface of the brain.

In commenting on this very interesting case, Dr. Davies stated that palsy, coming on suddenly, not preceded nor accompanied by any apparent disease of the brain, is by no means uncommon in children between the first and tenth years. In all these cases, he believes—and facts fully demonstrate the truth of his opinion—that the predisposing cause is the process of dentition. The exciting, or immediate cause has, he says, in the majority of cases, appeared to be some derangement of the digestive organs. In this peculiar case, he remarks that the exciting cause was the succession of shocks received by the spinal cord through the use of the baby-jumper.

This interesting and valuable instance of palsy occurring in an infant, bears directly on the statements that have been advanced respecting the dangerous consequences of neglected dentition. Had this poor little sufferer been subjected to the innocuous and highly beneficial operation of lancing the gums on the morning she was taken ill, it is more than probable that all the serious symptoms which ensued would have been prevented, and the infant still alive to rejoice the hearts of its parents. That the distress and nervous derangement dependent on dentition were the predisposing cause of the palsy, we have the authority of a distinguished physician, whose energies and medical knowledge have been especially directed to the investigation and treatment of the diseases of women and children, for believing. Every fact in physiology and pathology at all bearing on the subject confirms this opinion. The cases yet to be narrated, and the facts which have been already made known, are such as not to admit of any doubt upon the subject. Warm baths and aperients, and the application of leeches, were relied on to remove a disease affecting the frame generally, and the nervous system especially, while the simple but most

efficient remedy, lancing the gums for the removal of the local cause of this general mischief, was apparently wholly neglected; at all events, no mention is made of its performance in the records of the case in the medical journals; it is therefore only fair to presume that it was not had recourse to. In this respect no blame attaches to the medical men, as their assistance apparently was not sought until the domestic pharmacopœia had been exhausted, and the disease was fully established. It is much to be regretted that the non-performance of this trifling operation led to the sacrifice of a human life, but it is to be hoped that the record of the painful results following its neglect will serve to open the eyes of parents and nurses to the folly of which they are guilty, in offering a sustained and almost systematic opposition to lancing the gums—a proceeding which has been the means of preventing, and of removing a vast amount of infantile disease, and consequently of saving many lives.

Similar testimony is borne by Dr. Marshall Hall, in his work, on the Diseases and Derangements of the Nervous System, in which he has published the case of a little girl, twenty months old, a daughter of Dr. Grant, of Thayer-street, who, while suffering from dentition, lost the power of elevating the right arm—that of closing the hand and of bending the forearm remaining. There was not any symptom of brain affection present. The case was clearly one of palsy from teething. The gums over the four eye-teeth, which were all coming forward, consequently were freely lanced every second day; the bowels well moved, and the diet strictly regulated. For fear of hidden disease within the head, two leeches were applied. A few days after the attack of palsy, the little girl was seized in the early part of the night, with a fit of crowing inspiration. This confirmed Dr. M. Hall in his opinion as to the cause of the attack, and the event justified the view he had taken. The child recovered perfectly, without any energetic remedy being used for the cerebral affection, by continued attention to the state of the gums, the stomach, and the bowels: an event, he says, which could scarcely have occurred from such simple measures, had

there been such decided affection arising from disease of the brain. The palsy and the cough completely disappeared when the four teeth made their appearance in the mouth.

(To be Continued.)

ARTICLE XVI.

Remarks on a Peculiar Appearance observed in the Gums of Consumptive Patients. By Theophilus Thompson, M. D., F. R. S., Physician to the Hospital for Consumption, &c.

The author after glancing at the risk of allowing the study of auscultation to supercede attention to general symptoms, refers to the discovery, communicated to the Society by the late Dr. Burton, of a blue line at the edge of the gums, as indicative of the presence of lead, and thence derives an encouragement to the examination of this part of the system, when there is reason to suspect any poisoned or morbid condition of the blood. He then presents the results of his observations in reference to this inquiry in cases of consumption, and avows his conviction of the frequent existence, in phthisical subjects of a mark at the reflected edge of the gums, deeper in color than the adjoining surface; in some patients a mere streak on a raised border, in others, a margin more than a line in breadth, of a vermilion tint, inclining to lake; the mark being most distinct around the lower incisors, but usually observable in both jaws, and often around the molar, but modified in its situation by the form of the mouth. The author has examined some hundred cases in the course of the investigation, and gives the analysis of 102, of whom he has full records. In forty of forty-eight women, the gingival margin is present; and in fifty-four phthisical men, although in a few the line is so faint as to be open to question, there is only one in whom it can be considered decidedly absent. He has reasons for suspecting that the same condition of the system which produces this state of the gums tends also to pro-

duce clubbing of the fingers; but he considers that the change in the extremity of the fingers rarely occurs till some time after the streak is manifest in the gums. Of seventy-six patients, forty-five were found to have clubbed fingers; of these forty-five, only one had gums free from the characteristic margin; yet twenty of the seventy-six had marginated gums, but no expansion of the extremities of the fingers. The author discusses the effect of various modifying influences, such as hereditary tendency, catamenial disturbances, and habits as respects cleanliness, but cannot connect the presence of the symptoms in question with any of these circumstances; but he is of opinion that causes which irritate the mucous membrane tend to accelerate and increase the manifestation of the margin. He suggests this as an explanation of the more frequent absence of the line in women than in men, and dwells on its practical importance, as indicating, in such cases, the use of refrigerants, as preliminary to the introduction of tonic remedies. The author canvasses the question whether a similar line exists in any other disease; he allows that M. Fredericq may be correct in the opinion that certain changes in the gums occur towards the close of various chronic diseases, but he has never yet observed the peculiar margin described in this communication, without detecting other indications of consumption, although frequently only incipient. As respects prognosis in phthisis, he proposes the general rule, that cases in which the streak is observed early, or is broad or deep colored, tend to proceed more rapidly than those in which it is absent or slight; whilst freedom from the streak, even in the third stage, affords encouragement in treatment. In reference to diagnosis, the author believes, 1st. That the absence of the streak in men affected with inconclusive symptoms of phthisis, may incline us to a favorable interpretation of any such suspicious indications; but that in women, rather less weight is to be attributed to this negative sign. 2nd. That the presence of the sign in women is almost conclusive evidence of the presence of the tubercular element in the blood. The paper concludes with the remark, that the symptom therein described is one of many proofs that consumption is *not* exclu-

sively a local disease, but rather a constitutional condition, requiring for its elucidation and treatment far more than an acquaintance, however exact, with the phenomena of auscultation.

[*London Lancet.*

ARTICLE XVII.

On the Use of Impure Gold for Dental Purposes. By W. Imrie, Surgeon Dentist.

During the last few months the public have been considerably alarmed by published statements to the effect that the gold used by cheap dentists is so largely alloyed with copper and other metals as seriously to injure the health of persons wearing artificial teeth. It has been declared that numerous persons have, after the introduction of artificial teeth into the mouth, been subject to all the symptoms of slow poisoning by deleterious salts of copper, produced by the action of the saliva on the plates upon which teeth have been mounted. It is of very great importance both for the satisfaction of the public and the credit of respectable dentists, that this matter should be rigidly inquired into. From the facts which have been made known, it seems impossible to doubt that many persons have been injured in health by wearing impure metallic plates. The writer has known one person, a medical practitioner, who, after wearing a plate for some months, which, on examination, was proved to consist chiefly of copper, suffered greatly from irritation of the stomach and bowels, with considerable emaciation, and great irritability and prostration of the nervous system. This gentleman commenced an action at law against the dentist, and it was only interrupted by his death from another cause.

The gold generally used by respectable dentists in this country is eighteen or twenty carat gold. Gold of eighteen carats is composed of eighteen parts of gold, and six parts of alloy;

the alloy being formed either of two parts of copper and four of silver, or of two parts of silver and four of copper, according to the degree of hardness required. In eighteen carat gold there would thus always be either two or four parts out of twenty-four consisting of copper. This proportion of alloy is necessary to impart strength and hardness to the gold used.

There is no doubt that cheap dentists use gold for making plates, springs, &c., for mounting teeth, alloyed to a far greater extent than eighteen carat gold, so that the alloy equals or even exceeds the gold in quantity. Indeed, the metal used in some cases, is so base, that the plates require to be gilt to impose on the parties wearing them. Of course the gilding, after a time, wears off, when the deleterious alloy is fully and constantly exposed to the chemical action of the saliva.

I have been so much interested in the important questions arising out of these facts, that I have taken the opinion of my friend and patient, Dr. Taylor, the distinguished analytical chemist, of Guy's hospital, respecting them. I proposed to Dr. Taylor the questions which suggested themselves to me, and I have received from him the following statement in reply, which is highly important, both on account of the interest which attaches to the subject itself, and from the unquestionable authority of Dr. Taylor:

Action of the Saliva on the Gold or Gilt Plates used in Dentistry.—If copper alone were used, a sub-chloride of the metal would undoubtedly be formed by the action of the chloride of sodima (salt) in the saliva on the copper. There would be a well marked brassy or coppery taste. The mucus of the saliva is generally acid, sometimes highly so. Under these circumstances, from the free access of oxygen by the mouth, the copper would be in part oxydized, and the oxyd thus formed would combine with the albumen and mucus, and be carried into the stomach, where the effect would be, in the course of time, that of slow poisoning by copper—griping colicky pains in the bowels, occasional purging, emaciation, loss of appetite, salivation (saliva greenish colored,) and in continued cases even paralysis. Copper has a tendency to accumulate, and thus pro-

duce bad effects. I do not, however, think that any of these symptoms could occur to a dangerous extent without the patient being thoroughly warned by the disagreeable metallic taste in the mouth. When copper is alloyed with gold and silver, a galvanic effect is produced by contact with the saliva, by which the chemical action on the copper is increased. There is no chemical action on the gold, and the effect on the silver is chiefly to darken it by producing a sulphuret from the sulphur contained in the salts of the saliva and the mucus and albumen (ptyalin.) The saliva does not produce with the alloy of gold and silver any compounds which can produce injury to health. From what has been said, therefore, it follows that unless the copper be well protected by a large admixture of gold and silver (especially the former,) and thoroughly alloyed therewith, a noxious chemical action will be set up, likely in the course of time to produce effects injurious to health. The maximum quantity of copper contained in the gold of 18 carats, used by respectable dentists, is 16 per cent., while the gold is 75 per cent., and the silver about 9. I do not think that any alloy of this kind could have any effect injurious to health. Supposing the metals to be well alloyed, the copper would be, I believe, effectually protected. When the copper amounts to 50 per cent. or more, or the surface is merely coated with gold, then the effects of chronic poisoning by copper may be expected to take place. A. S. TAYLOR, M. D., F. R. S.

3, Cambridge-place, Regent's Park.

It will be seen that Dr. Taylor's observations go very decidedly to prove that the eighteen carat gold used by respectable dentists can have no deleterious action whatever upon the animal economy. It is equally evident from his remarks that a baser metal than this could not be used without danger to health, and even risk to life, if the quantity of copper in the mouth should be large. I have no doubt either, that in persons suffering from disordered health, the state of the saliva is so altered as to affect the copper plates more decidedly than would occur in persons in good health.

Various remedies have been suggested for the prevention of

these mischiefs, by forcing dentists to use in their work, gold of sufficient purity to remove all risk of poisoning or injury. In particular, it has been proposed, that all gold plates, pivots, springs, &c., shall, after their manufacture, be sent to Goldsmith's Hall, there to be tested and marked, but I would submit, that with the present method of stamping, this proceeding would be impracticable. It is necessary for the ease and comfort of persons wearing artificial teeth, that the adaptation of the plate to the gums and palate should be perfect. Stamping the plates after their completion could not fail to injure them, and in cases requiring springs, these parts could not be stamped at all without destroying them. It would be difficult to suggest any other mode of marking gold, which should be a warranty of its being within the sufficient degree of purity.

In some cases ivory is used instead of gold for dental plates, as for instance in elderly persons in whom the alveolar ridges are sunken and absorbed; but in the great majority of cases ivory can never be a substitute for gold, owing to the incompatibility of a due degree of thinness and strength, in ivory plates.

The only remedies against the imposition of base metal upon the public, instead of gold of the requisite purity, seems to be, that persons shall be informed of the ordinary signs of inferior gold in the plates they wear. In suspicious cases, it would be easy by applying to a dentist of character, to have a small portion of the plate analysed, and if it were found sufficiently alloyed with copper or any other inferior metal to injure health, no doubt the parties thus offending could, and ought to be, legally punished.

Whenever the plates upon which sets, or partial sets, of artificial teeth are mounted become blackened and discolored by the action of saliva, and particularly when the discoloration is accompanied by a constant metallic taste, as of copper, the purity of the metal should be suspected, and the plate at once examined either by a practiced dentist or by an analytical chemist.

The public have, however, the great remedy in their own

hands, which is, never to employ persons advertising themselves in the newspapers, or at the corners of the streets as cheap dentists—who profess to supply teeth in partial, or even full sets, at a price at which it is utterly impossible gold of the requisite purity for health can be used. Those persons are either willingly, or from mere carelessness deceived, who pay for an excessively cheap material, and expect a valuable article in return. If cases in which teeth have been mounted on impure gold are inquired into, it will be found, that they are instances in which cheap dentists have been employed. No man of station, and with a creditable reputation in dentistry, would dream of risking his reputation and practice by inserting poison in the mouths of his patients. I may repeat, then, that if bad dentistry be a great evil, the public have undoubtedly the remedy in their own hands.—*London Lancet.*

ARTICLE XVIII.

The Austrian Remedy for Cholera.

The chief commissioner of the Birmingham police lately placed in my hands a bottle of cholera medicine, which he had received from the head of the Austrian police, as being in use in that country under the influence of the government, it having been found to be a specific.

The printed description stated, "that the inventor had been allowed in 1831-2 by the government to try its efficacy on some convicted criminals, and that the result was the recovery in *every* instance; and that many thousand persons having since been cured by it, the government in 1849, commanded its employment in several large provinces, in prisons and public establishments, including the police, *and that not a single person who took the specific, where any hope of life remained, failed to*

recover, and that, too, without the slightest detriment to general health." This was apparently so decisive of its great value, that I determined to analyze it, and publish its components for the use of the world at large.

I find in the fluid ounce,—

	Grains.
Sulphuric acid (density 1.845)	19.
Nitric acid (density 1.500)	12.
Sugar	24.
Water	406.5
Fluid ounce, specific gravity, . 1.055	= 461.5

The sugar is now that of grapes, but it has no doubt been altered by the acids.

The mode of administration is said to be as follows :—

As soon as any premonitory symptoms of cholera show themselves, one tea-spoonful of the mixture is given, diluted with four or five of water; cold water is also freely drunk immediately after. At the end of half an hour, in mild cases, the dose is repeated, and this is often all that is required.

The original anguish of the patient is generally found to undergo a remarkable diminution soon after the first dose; he becomes warmer, and the pain in the stomach and breast rapidly abates, and then ceases. In the same degree in which the patient recovers his warmth, he becomes conscious of thirst, and feels a longing for cold water; in order to satisfy this, a tea-spoonful of the acid is mixed with a pint of water, and of this the patient is allowed to take *ad libitum*.

When the symptoms do not rapidly yield, the dose is repeated at short intervals in the way already described. Where vomiting does not occur, four or five spoonfuls generally effect the cure. When, however, the phenomena of collapse have already set in, with continual vomiting, diarrhea, &c., the acid mixture must be given in double doses—namely, two table-spoonfuls at a time, in four or five of water, and repeated after every attack of vomiting until the sickness ceases, and the cramps abate; after the vomiting has ceased, the medicine must still be repeated every quarter of an hour until at least six

spoonfuls of the mixture have been retained on the stomach. Cases have occurred in which it has been necessary to give as many as ten to fourteen spoonfuls before vomiting ceased. Cessation of pain, abatement of cramp, and a warm perspiration, are the first signs of amendment. Should quiet sleep set in, it must not be interrupted. Cold water may be freely given, unless perspiration has commenced, when no more should be given than necessary to abate thirst. All warm or spirituous liquors should be avoided as so much poison.

This horrible complaint has hitherto baffled all practitioners, and eluded every mode of treatment that I have seen practiced; but this remedy comes with so good a character, and is so unlike those I have hitherto heard of, that I think it well worth a trial; nor can I refrain from mentioning that it has been remarked, that Asiatic cholera does not prevail in cider counties, where the general beverage has some resemblance to this medicine, though weaker in degree.

I am, sir, your obedient servant,

WILLIAM HERAPATH.

[*London Lancet.*

ARTICLE XIX.

Orbital Exostosis.

Mr. E. Canton, exhibited to the Medical Society of London, at the meeting in May, 1851, a specimen of orbital exostosis, which he had removed from a female, who applied to him at the Royal Westminster Ophthalmic Hospital. The patient is between twenty and thirty years of age, and in good health. She stated that seven months since, she noticed that her right eye began to protrude, and from that period to the present, the projection was steadily on the increase, at the same time that the organ was directed outwards. No pain was felt; vision was perfect; but the disfigurement was so

detrimental to her as a servant, that she was anxious for its removal. On examination, it was found that besides the symptoms mentioned, the orbital ridge was increased in thickness, and a hard tumor, continuous with it, passed downwards, and deeply backwards into the orbit, so as to press upon the upper and back part of the eye, and cause a projection of the latter. Mr. Canton, having placed the patient under the influence of chloroform, made an incision from the external to the internal angular process of the frontal bone, in a semi-circular form, immediately below the eyebrow. The integuments, orbicularis muscle, and palpebral ligament being cut through, the dissection was continued into the orbit and around the tumor, so as to free the latter from neighboring and adherent soft parts. A small chisel was then used, in accessible situations to the bone of the tumor, which by degrees became detached from the orbital part, and was withdrawn from between the latter and the upper and lateral part of the eye. Sutures, plaster, and water dressing were applied, and the patient in a week recovered, not having had a bad symptom. The sight on the affected side, is nearly as perfect as on the sound one. The tumor is bony, about the size of a walnut, very heavy, and formed towards the periphery, of compact bone; whilst within the structure is of a close reticular character. The size of the base is equal to the surface of a shilling. The compact part of the tumor shows, under the microscope, some very large Haversian canals.—*London Lancet.*

ARTICLE XX.

Instrument for Arresting Epistaxis. By M. Gabriel.

This is a tube made of caoutchouc, carrying at its extremity a dilatable balloon, which, when introduced into the nostrils in its undistended state, may, by the process of insufflation, be

made to assume such dimensions, and exerting such pressure as completely to arrest the hemorrhage.

A simple method of plugging the posterior nares suggests itself in examining this tube with dilatable extremity. This operation as at present performed, whether with a special apparatus, or with an ordinary catheter, is frequently very troublesome, though simple in appearance. If the tube be introduced from before backwards through the cavities of the nose, until it has quite cleared the posterior nares and arrived in the pharynx, and be then dilated and drawn forwards, we obtain a more complete and manageable plug than that usually made of lint.

[*Dublin Quar. Jour. of Med. Science.*

ARTICLE XXI.

On the Use of the Nitrate of Silver in Lacerated Wound of the Face.

Miss R.——, aged about twenty. On a very windy day, a piece of slate was blown from the roof of a house, which fell upon her forehead, and inflicted a wound of five inches in length, commencing on the forehead, above the right eye, passing obliquely across the nose, and terminating on the left cheek, leaving a large open wound, quite disfiguring the face. The wounded parts after being well cleansed from extraneous matter, were neatly closed by the interrupted suture; the nitrate of silver was then applied along the edges of the wound, on the line of the wound, and also on the surrounding skin. Afterwards, strips of adhesive plaster were applied, without any other covering.

The wound healed by the first intention, and required no further application. It is now several years since the accident. A common observer, standing at a short distance, cannot see

the mark of the union, for no disagreeable mark or cicatrix remains.

Great advantages are derived from healing lacerated wounds on the face by the aid of the nitrate of silver.

1. It prevents irritation arising from the irregular edges of a lacerated wound, and it induces adhesive inflammation as readily as in an incised wound.

2. The inflammation, swelling and irritative fever, consequent on lacerated wounds, are in a great measure prevented, and there being no ulcerative process, there is no loss of substance, so that unsightly scars and raised cicatrices are obviated.—*London Lancet.*

ARTICLE XXII.

A Professional and Technical Puzzle.

The following extract appeared in one of the Cornish newspapers. In a will cause, tried at the late assizes, a surgeon gave the following understandable evidence for the benefit of twelve Cornish jurymen, in relation to the testator's capability of executing a will: "I found him in erysipelatous inflammation, face and scalp of a dusky brown, covered with furfuraceous scales, the result of the peeling of the cuticle; tongue dark, brown, and dry; pulse 120, and thready; slight subsultus jactitation; low muttering delirium; answered when roused, sometimes coherently, sometimes incoherently; he was in a sleepy comatose state, and clearly moribund."

BIBLIOGRAPHICAL.

Intermarriage: or the mode in which, and the causes why, Beauty, Health, and Intellect result from certain Unions and Deformity—Disease and Insanity from others; demonstrated by Deliniations of the structure and forms, and descriptions of the functions and capacities which each parent, in every pair, bestows on children. In conformity with certain natural laws, and by an account of corresponding effects in the Breeding of Animals, with eight illustrative drawings. By ALEXANDER WALKER. PHILADELPHIA: LINDSAY & BLAKISTON, 1851, 12 mo, pp. 384.

THE preliminary of this work is devoted to a very brief statement of a few anatomical and physiological facts, which are necessary as the ground work for the understanding of the proposed doctrine. It divides the human system into three classes of organs and functions, 1st. The *locomotive*, *vital* or *nutritive*, and the *mental* or *thinking*. The first is made to consist of bones, ligaments and muscles, by which all motion is produced. The second of lacteals, blood vessels and glands, which perform the functions of nutrition, secretion and excretion. The third of the special organs of sense, a brain which perceives, compares, reflects, &c., a cerebral or smaller brain, posterior to and below the former, which swells and gives action to the muscles, and this, power and motion, and from this latter source is derived sense, thought, motion and all connection with external objects.

Following this, is a tabular sheet, with a systematical arrangement of these various organs, with their respective offices, the knowledge of which, is indispensable to the full comprehension of the subject.

PART I.—Treats of the physiological conditions connected with, and terminating in love.

PART II.—Sexual relations arising from these conditions, and connected with a leading to intermarriage.

PART III.—Circumstances resulting from the preceding relation, and connected with, a production of progeny.

PART IV.—Newly discovered natural laws, regulating the resemblance of progeny to parents.

PART V.—Vague methods of regulating progeny, adopted in the breeding of domesticated animals.

Part VI.—Application of the natural laws, to the breeding of domesticated animals.

Part VII.—Vague methods affecting progeny, adopted among mankind.

Part VIII.—Choice in intermarriage, and prescribed by the natural laws.

Part I.—*Section* 1. Assigns the cause of the earlier puberty of women over men, to be in the proportionally larger vital or nutritive system. In earlier life, the three classes of organs are considered equal, the girl not distinguishable from the boy in these particulars, until a gradual change occurring at different ages, according to the various influences of *climate, aliment, temperament*, &c., produces puberty, and which the author affirms to be dependent upon the magnitude of what he terms the vital system, liable to modification from various external influences.

Temperature of climate modified, produces marked effects, but which is far excelled by peculiar kind of food, as very nutritious, stimulating meats, aromatics, the habitual use of coffee, wine, liquors, &c. These hasten this period, whilst farinaceous substances, roots and vegetable diet, with the habitual use of milk, cheese, &c. rather retard it. Assuming such to be facts, he asserts that the rich and inhabitants of towns, reach maturity sooner than the poor and the peasantry, also the moral condition, from the different influences dependent on aliment, bearing upon these two classes of people, produce a striking difference in the periods of puberty.

That the retardation of puberty, retards the development of intellectual powers, but preserves energy and freshness of sentiment, and by giving better development to the body, produces longer life, but if this state be prolonged after the ordinary period, woman appears to approximate to man in taste and some external characteristics.

The statistics of puberty in different parts of the world is highly interesting, which are as follows: In Europe, women reach puberty later in the north than in the south, in the most elevated northern regions it does not occur till after twenty years of age. In England at about fifteen in girls, and seventeen in boys. In many parts of France it commences generally at fourteen years of age, but in the southern departments, at thirteen. In Italy and Spain it takes place at twelve, and marriage often occurs at twelve. In Greece it is usual at ten. In Persia at nine or ten, which is also the usual age of this period in Arabia, Barbary, Egypt, Abyssinia, Senegal and various parts of Africa. Siberian women of the Mongolian race are marriageable at the age of thirteen, in a climate as cold as that of Sweden, whilst the Swedish female is scarcely so at fifteen or sixteen. But what is most remarkable by this statement is, that the Lamoides, inhabitants of the polar regions, are nubile at eleven, and frequently mothers at twelve.

We find that the precocious development of maturity before completion

of growth, diminishes stature, depreciates beauty and intellect, and produces premature age.

In sections 2 and 3 is given the changes in the locomotive system, as well as in the vital, by the growth of the muscles, bones, and the general stature; thus accounting for the change of voice of lads and girls having reached pubescence; following, is a summary of physiological phenomena related in a very popular style, which cannot fail but to be instructve, and highly useful to the general reader.

The causes of many diseases and deformities affecting health, and the function of generation are here given. The striking peculiarities of sex are also shown to be dependent upon peculiar organic structure and habit. The want or interference with this structure, followed by certain consequences, detrimental to perfect development.

In sections 4, 5 and 6, much is said about love, affections, moral influences, &c., and physiology is taxed to its utmost to establish these as physiological results, and is treated in modest, pretty language, but is better calculated to please the young, than the old, and yet could hardly be dispensed with to complete the design of this work.

Part II—treats of several relations arising from mentioned conditions, and connected with, or leading to intermarriage, under the heads of *useful guidance, dangerous restraint, necessity of intermarriage.*

Part III.—Circumstances resulting from the preceding relations, and connected with, or production of progeny, under the head of *natural preferences of the various kinds of beauty, for the first time explained, state of marriage, forms and qualities propagated.*

Part IV—Newly discovered natural laws, regulating the resemblance of progeny to parents, under the head of *laws of resemblance, laws of selection,* &c. We deem it unnecessary to go farther, simply for the reason that in parts V, VI, VII, and VIII, much is said that is, to say the least, repugnant, if not unnecessary, to the class of readers that this work is intended to serve, thinking that the subject might have been so treated, as to have fitted more for social reflection, than for the farrier or breeder of stock. That abundant facts, more striking and acceptable, could be found to establish all points, if the author had confined himself to illustrations more human. The mixing up of "approximal diversities" with "dogs, pigs and horses," seems to us a strange mistake, in a work calculated for moral and intellectual improvement. We are lovers of comparative anatomy, but not of this stamp, and regret that we have aught to find fault with, connected with so much that is good and highly serviceable.

There are many so fastidious as to object to this treatise upon such delicate subjects, but we should think no one could attentively read it, and not receive new ideas of practical instruction, and much insight into the intricacies of human nature.

Elements of General and Pathological Anatomy, presenting a view of the present state of knowledge in three Branches of Science. By David Craige, M. D., F. R. S. E. &c., &c. Second edition, enlarged, revised, and improved. Philadelphia: Lindsay & Blakiston, 8vo, pp. 1072.

The above is the title of a recent work in its second edition, which gives most of the facts acknowledged by modern pathological anatomists.

It examines most of the prominent opinions of almost all writers upon this subject, and must be valued principally as a comprehensive review of the thoughts and views of others. For this reason it will be esteemed a good work for reference, and as its nomenclature is full even to a fault, there will be found names for all diseases in abundance. The vast accumulation of materials for such a work, spread through such an immense amount of matter, renders such an undertaking a labor of unusual toil. The author has done well as far as he has gone, and serviceably condensed a vast amount of knowledge in a small space so that, for the student, or the physician's library, this must be esteemed a valuable acquisition.

We conceive it a great error in such a work, to devote so small a portion, and in so careless a manner to the subject of the *Teeth,* and which is too often the case in almost all works of the kind. This culpable want of attention, to so large and highly important a branch, both of anatomy and pathology, gives rise to the prevailing deficiency of correct imformation upon the growth, structure, and diseases of the teeth existing in the medical profession, and that, too, in high places. Mr. Craige, in this particular, is no better than others who have preceded him, and we condemn such carelessness. A work proposing to give facts in anatomy and pathology, should embody all principal facts, and give such facts their true weight and importance. This work is wanting altogether in the minute structure of the teeth, &c., the mere pronouncing "that their development and growth is a process of much interest," is not sufficient for a scientific treatise. Again, on page 490 is found, in treating on the diseases of these organs, "that the mostfrequent cause of disease of the teeth, is inflammation of their internal pulp, an error too palpable to comment upon. Following, is another mistake, which the fault of carelessness will hardly cover. He says, "This, speaking from the previous quotation, by progressively destroying the membrane, impairs the nutrition of the tooth, which becomes carious in the bony pith, while the enamel cracks, and is cast off in the form of concave scales or crusts." All which is wrong, and contrary to facts, which any one at all acquainted with the subject will perceive to be glaring and culpable errors.

Inflammation of the pulp is always the effect of morbid or mechanical action from without, and never occurs only as a consequence of disease,

as a result of a change in the normal condition of surrounding parts, or general system, and is never the prime cause of disease of the teeth. We regret that space prevents longer comment; and will finish, by stating, that in excepting a few doubtful points, the work is valuable in many respects, but offers traces of carelessness that should not occur in any future compilation.

The MICROSCOPIST, *or a Complete Manual on the Use of the Microscope, for Physicians, Students, and all Lovers of Natural Science, with illustrations.* By JOSEPH H. WYTHERS, M. D.

THE above is the title of a small volume, comprising, in a small compass, all that is interesting and useful to be known upon the subject which it treats.

The first chapter is devoted to the history and importance of microscopic investigations. The second and third, to the microscope itself, and its different varieties with their several adjuncts.

The fourth and fifth teach the method of using the instrument with the manner of mounting and preserving objects for examination. Sixth and seventh treat where objects for examination are to be procured, and what is called "test objects." The eighth shows the manner of dissecting objects for the microscope—and the ninth, tenth, eleventh, twelfth and thirteenth chapters are devoted to the cell doctrine, morbid structures, minute injections, examination of urinary deposits, and polarized light.

Annual Announcement of the Medical Faculty of McGill College, Montreal, for Session 1851–2.

THE system of medical education pursued in the McGill College of Montreal, differs materialy from that of similar institutions in the United States. Each session continues six months, and each candidate for graduation is required to attend four courses before he can present himself for examination for the degree of Doctor of Medicine and Surgery. He is also required to give proof of having attended the practice of the Montreal, or some other hospital, having beds for at least forty patients. He must moreover furnish evidence of competent classical attainments.

The Faculty consists of one professor, nine lecturers and one demonstrator. Each teacher is required to deliver at least five lectures during the week; each of one hour's duration, and to give the pupils one examination, which, however, is regarded as equivalent to one lecture. The departments in the institution are, Anatomy and Physiology; Chemistry;

Theory and Practice of Medicine; Midwifery and Diseases of Women and Children: Principles and Practice of Surgery; Materia Medica and Pharmacy; Clinical Medicine; Clinical Surgery; Practical Anatomy; Institutes of Medicine; Forensic Medicine, and Botany.

The medical degree granted by McGill College is that of Doctor of Medicine and Surgery.

Seventh Annual Announcement of the Ohio College of Dental Surgery. Session of 1851-2.

We are gratified to learn from the above announcement, that the college building and museum, have been purchased by an association of dentists, thus relieving the faculty from the embarrassments under which it had previously labored. The departments under the reorganization are, Principles and Practice of Dental Surgery; Anatomy and Physiology; Pathology and Therapeutics: Operative and Mechanical Dentistry and Chemistry.

We also perceive that the faculty have adopted the plan pursued by the Baltimore College, of appointing an examining committee, to be present at, and to participate in the examination of the candidates for the degree of Doctor of Dental Surgery. This is as it should be.

Most sincerely do we hope that those who are connected with the above institution may be abundantly rewarded for their arduous labors.

Annual Announcement of the Rush Medical College of Chicago, Illinois. Session of 1851-2.

We are pleased to perceive from the catalogue of students accompanying the above announcement, that the institution is in a flourishing condition. The lectures for the coming session, will commence the 3d of November, and continue sixteen weeks. Candidates for the degree of Doctor of Medicine, are required to be twenty-one years of age; to have pursued the study of medicine three years, and to have attended two courses of lectures, the last to be in this institution. He must also have taken the dissecting and hospital ticket during, at least, one college term.

Annual Announcement of the Medical Department of Pennsylvania College. Session 1851-2.

We learn from the above announcement, that the lectures in the medical department of this institution, will commence on Monday, 13th of

October, and continue until the first of March. Besides the regular lectures, clinical instruction will be given in the Pennsylvania hospital, by the physicians and surgeons of that institution, and in the college, by the Professors of the Principles and Practice of Medicine and the Principles and Practice of Surgery.

A New Sign Language for Deaf Mutes.—The above is the title of a thesis presented to the medical department of the University of Buffalo, in February, 1851, by Albert J. Meyer, and is a valuable and happy suggestion of what must be considered an important improvement in the languages used at the present time by mutes and the blind. The article itself is last in the importance of that which is propounded, and after the proposition of the plan, little is said of striking importance. Upon the whole, it is well written, and expresses the object in a few words, and much to the point.

From the fact that the sense of touch is always existing with life, and more generally perceptible than any other organ of sense, it strongly recommends itself, and doubtless will be adopted as it becomes better known and understood.

A Plain Treatise on Dental Science and Practice. By S. M. Shepherd.

This is a small work intended for private distribution, and for popular instruction, and of course out of the reach of a review. But we are pleased to acknowledge its receipt, and the compliment intended in its dedication to our confrère. It contains a great many good things, and will no doubt be highly beneficial in imparting such knowledge, the possession of which, will prevent many injurious consequences to health and happiness.

Ignorance is a terrible opponent to science and professional skill, and the ardent mother of all empiricism. Any means calculated to reduce this evil is highly acceptable, and must be encouraged. We trust the Dr. will make himself more generally known by contributing to our public mediums such facts as we see he is highly competent to treat upon, and can guarantee him attentive readers. B.

Report on the Medical Department of the University of Pennsylvania, for the Session 1850–51, *to the Alumni of the School.* By the Medical Faculty.

The above pamphlet gives a statement of the flattering success attending the last session of this institution.

The matriculants during the last year numbered 468, and graduates 167, which might have been increased greatly if the faculty had relaxed the long established stringent rules of graduation. It is full, and much to the point, evincing a dignity becoming the standing of so old an institution. All interested in its progress and welfare will be highly interested in reading this short and ably written report.

Washington University of Baltimore, Medical Department.—We have received the annual circular of this institution for 1851-2, and are pleased to find that the prospects of the faculty are more than ever cheering.

The gentlemen connected with this school are well known for high professional character and talent, and deserve the sympathy and support of the community. Competing with institutions largely endowed by the public money, they have, by personal efforts and private means, established themselves in a most favorable position. Their building is as elegant and commodious as could be desired, their ability undoubted by any, and their industry has been sufficiently proved by the obstacles they have already overcome.

We observe that the chair of surgery is filled by Dr. Valentine Mott, Jr., a gentleman of great surgical experience and skill, whose romantic patriotism as exhibited in the Sicilian resolution, has already made him known to the community.

We sincerely wish success to the Washington University of Baltimore.

EDITORIAL DEPARTMENT.

American Society of Dental Surgeons.—As we were prevented from attending the last meeting of the American Society of Dental Surgeons, held the 5th, 6th and 7th of August, in Philadelphia, we are indebted for the information we have, concerning the transactions of the occasion, to the courtesy of the secretary, Prof. Cone, who has kindly permitted us to examine the minutes of the proceedings, and to a brief abstract of the doings furnished by one of the members. The reports of committees and addresses read at the meeting, have also been placed in our hands by the chairman of the publishing committee, for publication; most of which will be found in another part of the present number of the Journal. The Society met at Sanson-street Hall at 9 o'clock, Tuesday, August 5th, and after having been called to order by the president, Dr. E. Parmly, the

dentists of Philadelphia were, in accordance with a resolution offered by Dr. E. Townsend, invited to attend the discussions of the society during the meeting. The order of the business for the session was then announced by Dr. J. H. Foster of New York, chairman of the executive council.

During the morning session of the first day, the publishing committee reported that the Aphorisms ordered at the preceding meeting, had not been placed in their hands. The treasurer's report was read and referred to a committee to be audited. The members appointed at the meeting held in 1850, to prepare Aphorisms on Specified Subjects, on being called on, informed the society, that they had performed the duty assigned them.

It will be recollected that at the preceding meeting, a resolution was offered, calling for the appointment of six members, each to prepare a series of aphorisms on a specified subject, and that when prepared, to be placed in the hands of the publishing committee for approval and immediate publication, with six other series which had been previously prepared. But as the last six, had not been placed in the hands of the committee before the meeting, Dr. Townsend moved, that they be submitted to the society for its approbation previously to their publication.

Dr. W. O. Laird's name, agreeably to his request, communicated by letter to the secretary, was stricken from the list of members. A committee was then appointed, on motion of Dr. Dunning, to confer with the treasurer, and report the names of such members, as had forfeited their membership by the non-payment of their yearly dues. Another committee was appointed, to take into consideration the propriety of altering the constitution of the society, with instructions to report such alterations and amendments as might be deemed necessary. This committee, composed of two members, Drs. Townsend and Arthur, has, by subsequent action of the society, until the next meeting, to make its report. We sincerly trust, the subject entrusted to it, will receive that calm and deliberate attention its importance demands. There are many parts of the constitution which require alteration, and new provisions should be introduced.

Wednesday the 6th, at 4½ P. M., having been fixed upon as the time for the delivery of the opening address by Dr. Foster, the secretary, on motion of Dr. Townsend, was instructed to invite the public to be present on the occasion, the invitation to be published in two of the daily papers.

The Aphorisms of Dr. Dunning, on the treatment of exposed dental nerves, were next read. As we have not seen the series, we are ignorant of the views which they embody, but learn from the proceedings of a subsequent session, that the two first were amended so as to read, "a tooth, whose nerve is exposed, may be permanently saved, by entirely removing the pulp, and filling the place occupied by it with gold."

We presume we understand the idea intended to be conveyed by this Aphorism, but we fear the impression it will make upon the minds of

most persons, will be different from that intended by the society. We suppose the meaning of the Aphorism to be this, that a tooth, the nerve of which is exposed, may, in the majority of cases, or often, be saved for many years, and sometimes through life. As it now reads, it may be taken without any qualification, and if an individual into whose hands it may fall, should have a tooth treated in this manner, and if, perchance, it should ever give rise to alveolar abscess, or other diseased action in the surrounding parts, requiring for its cure, the removal of the organ, the judgment of the society would ever after be held in light estimation by that individual. If the mover of the amendment, or the society, had reflected a moment upon the subject, we think some qualifying word would have been introduced, whereby the meaning of the Aphorism could not have been misconstrued.

During the afternoon session of the first day, Dr. A. C. Hawes, read a series of Aphorisms on the preservation of the teeth, and Dr. A. Hill, a report of the result of his experiments for obtaining metallic bases, for artificial teeth, by the electro-galvanic process, which was followed by some remarks from Prof. J. Allen, of Cincinnati, upon the same subject. Prof. A. then went on to speak of some experiments which he had made for securing single teeth to plates, by means of a fusible mineral attachment, which had thus far proved highly satisfactory to himself. He also exhibited several pieces illustrating his discovery. This method of mounting teeth, has been practiced in France for about thirty years, and there is now in the museum of the Baltimore College of Dental Surgery, a double set of teeth, presented to the Institution, by Dr. Townsend of Philadelphia, mounted in this manner. They were made some nineteen or twenty years ago.

The committee appointed to confer with the treasurer, and report the names of such members as had forfeited their membership by the non-payment of their dues, now made their report, when a resolution was offered, ordering the names of such members to be stricken from the roll.

During the forenoon session of the second day, Dr. A. Hill, read an essay on artistic dentistry, and Dr. A. C. Hawes, a paper on professional empiricism. The remainder of the session, was taken up in the transaction of private business, and in the discussion of the subject of the Aphorisms, on the treatment of exposed dental nerves, in which Drs. Arthur, Westcott, Dunning, Allen, White, Bridges, Foster, J. Parmly, Cone, Hill and Robertson, took part.

In the afternoon, Dr. J. H. Foster, delivered the annual oration, which, we understand, was pronounced, by all, to be an able production. This we have not seen, but hope to have an opportunity of placing it before our readers.

This day, the society had an evening session, during which, Dr. Arthur read a report on American dental literature, after which Dr. Townsend

read a paper on the preservation of the temporary teeth, and the treatment of irregularity of the permanent ones, which gave rise to some discussion.

A portion of the session of the morning of the third day, was taken up in the transaction of private business; after which, Dr. E. Townsend, proposed the following amendment to the constitution, reading from the one first adopted, Art. 5, "Of the requisition of membership. Sec. 1. Each and every acting member of this society, shall either have become such, by virtue of his attendance in person, by proxy, or by letter, at the time of its formation, or as shall be afterwards elected, as shall be prescribed by the constitution, and subscribed to the same," *Provided*, that all delegates appointed to represent recognized dental colleges, and associations of dental practitioners, organized for scientific purposes, shall be admitted to all the rights and privileges of acting members of this society, as fully as if they had been elected to such membership by ballot, under the provision of Art. 6th, of this constitution.

The above amendment, Dr. T. supported by the following argument, read to the society, and a copy of which has been kindly furnished us for publication.

"Mr. President—I have offered this amendment to our constitution, for the purpose of supplying a provision which is so completely within its scope and purpose, that its absence seems a mere oversight in the original draft of the instrument. The election, by ballot, which is the prescribed mode of admission to membership in all cases, as the constitution now stands, is, of course, but a method of ascertaining the worthiness of the applicant, who, in all cases, except those contemplated by the amendment now submitted, comes to us without other warranty than his personal or individual character, upon which it is right and necessary that this society should make up a deliberate judgment before admitting him, and thereby endorsing him. But delegates from recognized dental colleges and associations, in other words, bodies of our professional brethren which we acknowledge and respect, come to us with credentials which we are bound to honor as much as we ask other bodies to respect and honor our own. And it is a violation of right and propriety to make such delegates wait at our doors for admission, after they have sent in their cards and letters of introduction, while we go through the form of rejudging the judgment of the men who sent them. We certainly would not willingly have our trusted and honorable representatives so received, by any society of equals in the world, and I know we would not send representatives to any society which held itself our superior. When a respectable association of scientific men have selected delegates, to any other with whom they are willing to enter into professional reciprocities, to examine in any way, or to subject to any test, the worthiness of such delegates, is to disregard and discredit those who gave them their appointment.

"I need say no more on this point, except to add, that the amendment

in effect, does nothing but allow the endorsement of respectable societies and colleges to pass unquestioned with us; and members so admitted, will come in, subject to all the conditions and entitled to all the privileges, and none other, that attach to those admitted by our present mode of initiation. They will stand to us precisely as if we had unanimously elected them, and it will remain with them as with others, to sign the constitution, and comply with its provisions, in order to entitle them to equal participation with us in all that pertains to full membership in our society. Mr. President—Mere verbal or ceremonial amendments to constitutions are not worthy of the time they occupy, and I would not propose one, unless I thought the *words* which I suggest meant *things*, and the *forms* stood for important substances. We *style* ourselves 'The *American* Society of Dental Surgeons,' and our objects, as they are stated in the preamble to the constitution, are, among others, 'to promote union and harmony among all respectable and well informed dental surgeons; and to advance the science by free communication and interchange of sentiment, either written or verbal, between members of the society, both in this and other countries.' Thus the name and the attitude which we take, assume to fraternize the men, and centralize the movement by which our profession is to be carried forward to its destined position in the world of science; and it is incumbent upon us to adjust and address ourselves to our function by every proper means that promises to promote our aim.

"The adoption and publication of this amendment, in connection with our other action on kindred points, I conceive, will indicate the liberal and cordial spirit which animates us, and will be received as an earnest overture to the professional brotherhood everywhere, for that correspondence and co-operation which must answer to the achievement of our great design. Eleven years ago our society rose out of the crowd of professors, and pretenders to dental skill, for a purpose which happily stands well accomplished now, whatever agencies may take the credit of it. I mean, that it drew a line of distinction between the rabble of quacks and the men of honest pretensions, expecting that the profession would soon be found *within* its membership, and the charlatans *without*. Or, at least, that by its effort to help all other agencies, a standard would soon be established for public judgment which would render honor to whom honor was due, and rid the profession of all the responsibility and discredit of empiricism; now this work is well enough accomplished to answer all the ends for which it was undertaken, and the attitude of offensive and defensive war should be changed in all points, so that no prejudice or suspicion shall be allowed to remain, that we are taking more care of our character and caste, than of the *other* great interests of the profession.

"Mr. President—A society is like other creations, made of live materials, where it ceases to grow, it begins to die; not consciously, perhaps, but none the less certainly. The laws of the human body well represent the

laws of human societies—whenever the *old* ceases to be replaced by the *new*, when the work of assimilation and the incorporation of fresh elements stops the body, or the society is on the turn; and decline onee begun, means death for its conclusion. Churches need revivals, and political governments occasionally refresh themselves even with revolution, scientific societies also demand renewal in spirit and in *men*, but they can secure it by providing for their regular growth and constant accommodation to the changed conditions around them by corresponding changes within them.

"I know I do not mistake the feelings of this association, and I am sure I understand its objects—they are both liberal and enlightened—and they aim earnestly at the greatest advancement for our profession which they can contribute to secure.

"Let us manifest, by every means within the compass of our power, that we design and desire the union, harmony and co-operative activity of every worthy worker in the cause of progress, that we have no jealousies of rank and no privileges of age to defend, that we do not wish to establish a close corporation of exclusives, but a liberal republic of dental literature and science—we might invite delegates in words of respect and welcome, or wait until they offered themselves and then admit them to the courtesies of our annual meetings, but such men as there is any interest or honor in inviting would not come to us as guests to receive our hospitalities, they would come and we would receive them as equal members, on the level platform of a broad brotherhood that exchanges honors and benefits evenly. There are dental colleges and dental societies now in several regions of our own country, and there are some associations abroad, whom we would warmly welcome into friendly correspondence and fellowship of effort, and we will have done our duty in the matter, by opening our doors widely for their admission. The 15th article of the constitution requires a majority of three-fourths of all the active members or fellows present to carry an amendment. I am flattering myself, sir, with the hope of an unanimous vote for this one, which I have the honor to propose."

The amendment and argument were, by a vote of the society, laid on the table.

With regard to the propriety and expediency of engrafting Dr. T's provision into the constitution of the society, we have not now time to express an opinion. We may hereafter recur to the subject.

The aphorisms of Dr. E. Parmly, were taken up, and adopted, article by article. It would seem, from a resolution of Dr. J. D. White, that the society intended to discuss the cause and treatment of irregularity of the teeth, but deferred it until the next meeting, and on motion of Dr. M. K. Bridges, one member was appointed from each of the principal cities, to investigate the subject and report at that time. This committee is composed of Drs. M. K. Bridges, E. G. Tucker, J. D. White, J. Allen and C. O. Cone.

Drs. J. D. White and E. Townsend, were appointed a committee to make microscopical observations on the characteristics of salivary calculus and the fluids of the mouth, in connection with the human teeth, and to report at the next meeting of the society.

Various subjects connected with the practice of dental surgery were discussed by several members of the society, after which, the following gentlemen were elected officers for the ensuing year:

Dr. E. Parmly, of New York, President; Dr. E. Townsend, 1st Vice President; Dr. J. H. Foster, 2d Vice President; Dr. J. Tucker, 3d Vice President; Dr. C. O. Cone, Corresponding and Recording Secretary; Dr. E. J. Dunning, Treasurer; Dr. D. R. Parmly, Librarian; Drs. C. O. Cone, E. J. Dunning and D. R. Parmly, Publishing Committee; Drs. J. H. Foster, E. J. Dunning, E. Parmly, A. C. Hawes, C. A. Harris and H. N. Fenn, Executive Counsel and Examining Committee.

Dr. Arthur was appointed to deliver the opening address at the next annual meeting, and Drs. J. D. White, E. Townsend, E. G. Tucker, J. Allen and A. Robertson, to read essays on subjects connected with the theory or practice of dental surgery; Dr. C. A. Harris was appointed a committee on foreign dental literature, to report at the next annual meeting.

We learn that Dr. Williams, of Philadelphia, was elected a member of the society.

The society adjourned to meet the first Tuesday of August, at the Ocean House, Newport, R. I.

In addition to the foregoing summary of proceedings of the society, we take pleasure in publishing the following interesting notice, kindly furnished by one of the members who attended the meeting.

Twelfth Annual Meeting of the American Society of Dental Surgeons.—The annual meeting of this association was held in Philadelphia on the first Tuesday in August. A brief abstract of the proceedings will be found in another part of the present number of the "Journal."

This has, altogether, been the most agreeable and profitable meeting of the association it has yet been our privilege to attend. More profitable, probably, in its suggestions, than in the actual amount of new facts presented, although amongst these were some of considerable value.

A liberal spirit toward the profession at large, without regard to position, was manifested in the beginning, and circulars of invitation to attend its meetings were sent to most of the resident dentists of Philadelphia. A number responded to the invitation and attended the meetings of the association to the close.

A number of interesting papers were read by the several members who were appointed at a former meeting to prepare them. These will, in due time, be published in the Journal. Without wishing to be invidious, for all had real merit, we desire to notice the opening address of Dr. Foster.

This was an able production, and marked with manliness and a spirit of true liberality—it did not run off into that other extreme which, though frequently well meant, tends rather to countenance the dishonest in this bad practice, than to visit upon them that just condemnation which they deserve, and which it is due to the public that they should receive.

A very interesting discussion on the operation of removing the dental pulp sprung up on a series of aphorisms offered by Dr. Dunning on the subject. The results of, and the objections to the use of arsenic as an adjunct for the purpose, were freely canvassed. The discussion was discontinued for want of time, and not by any means because the subject was exhausted.

The subject of irregularities of the teeth also came up, and a good deal of new light was thrown upon this very important branch of our art, by the gentlemen who took part in the discussion. It, also, was cut off for want of time, and it was agreed that at the next annual meeting every member who could do so, should keep a record of instructive cases, which might come into his hands in the interim, and bring with him models to enable him to explain his mode of treatment. We look forward to the result of this effort to obtain some general views with regard to this matter with much interest. There is no subject within the range of our profession so little understood generally as this, and much good must result from this combined effort to throw light upon it.

Dr. Hill, who was appointed for the purpose of making experiments to ascertain whether it was feasible to produce plates by the electro-metallic process, in a manner which would be practically serviceable, exhibited several plates made in this way. They were deposited on the plaster cast. Dr. Allen, of Cincinnati, also exhibited several very beautiful specimens of plates formed in this way, and stated that several plates made in the same manner were now worn by his patients. Neither gentlemen, however, seemed to think, judging from the experiments he had made, that the process was of much practical value for this purpose. The principal objection seemed to be, that too much time was required to form a perfect plate, which Dr. Allen stated to be some seven or eight days.

Dr. Allen exhibited some specimens of a new method of mounting mineral teeth. On examining the sets of teeth, which he exhibited, they presented somewhat the appearance of block gum teeth, without any visible means of fastening. They were, however, firmly fixed to the plate. Dr. A. stated that the improvement consisted in a material he had discovered, which fused at a white heat without shrinking, attaching itself at the same time to the teeth and plate. Ordinary single plate teeth are used and arranged in the usual way; when they are properly adjusted, some of the material he uses, is moulded around them neatly, so as to form a gum, and to fill all the spaces between the teeth and plate. The whole is then put into the furnace and subjected to a high heat—the material between

the teeth and plate fuses and attaches itself so firmly, that the teeth will break before the connecting material will give way. As the plate is subjected to this high heat, it is alloyed with platina, to prevent it from melting. On being asked what was the material used, Dr. A. declined stating, alleging that the proper means of successfully using it, could only be acquired by personal instruction, which, for a just compensation for his time and labor, he was disposed to give. Dr. A. said he was opposed to taking out a patent for improvements in the profession, and although a caveat had been filed in the patent office for this particular improvement, it might be there forever. But as he had spent a great deal of time and labor and thousands of dollars to accomplish this object, he thought it but right that he should have some return for it. This he only desired, as we have stated in the way of compensation for instruction, which he was ready to give.

Since the meeting of the association, we have heard, through a friend, that Dr. Hunter of Cincinnati, declares that he has a better material than that which was exhibited to the association by Dr. Allen, and that he will in a short time publish the method of preparing it.

In a short familiar discussion, which sprung up on the best manner of preparing gold for filling teeth, Dr. Arthur stated that for some time past he had for all kinds of cases used gold known as No. 30, with great advantage. It is used in this form by cutting it from the sheet in a single strip, nearly the size of the cavity to be filled, and is carried into the cavity with instruments of the usual form. This is stated to be an important feature in its use, for if folded or rolled in the usual way, it will be perfectly unmanageable.

Amongst others, a very important committee was appointed for the purpose of making microscopical investigations of the teeth in a healthy and diseased condition, and also of the fluids of the mouth and the tartar. It is certainly quite time that we began to do something in this way for ourselves; we have heretofore been entirely dependent upon European laborers for all we know of the internal structure of the teeth, and have not even done so much as will enable us to judge of the real value of their researches. This committee consists of Drs. J. D. White and E. Townsend, of Philadelphia, gentlemen fully able to take up this important subject. They will probably have use of the best apparatus for the purpose in this country; and the profession will look forward with interest to the result of their labors.

It would afford us much pleasure to present an abstract of the discussion which took place at this meeting of the association, if time and space permitted. The greater part of them, however, were taken down by a reporter and will be published.

The meeting adjourned on Friday afternoon, to meet at Newport, at the usual time, next August.

We cannot but congratulate the members of this association upon the

delightful spirit which prevailed from beginning to end, at this meeting. All personal bickerings, which so often disfigure and destroy the usefulness of meetings of this character, in other professions, as well as our own, were avoided, and every man seemed to be looking rather to the general good of the profession, than considering his own personal advancement. The only regret seemed to be, that the time of separation came so soon.

Quacks Universally Advertise.—We do not mean by this, that all who advertise are bearers of the above title, because many skillful and talented men very properly insert their cards for the benefit of strangers seeking their assistance, but men who seek to draw business by their impudent bombast and falsehood, are in the last stage of charlatanism. Nor would we pretend to say that it is a sign of a man's genuine talent who is free from this professional crime. There is hardly a paper in the land which does not contain some astonishing announcement of the insertion or completion of some unequalled performance, either in operative surgery or mechanical dentistry. Now, it is such physicians and dentists that we denounce as quacks, sharpers and grinders. If they were honest men, and really possessed the pretended skill, they need no such artifice. Were such operations performed, have we not enough medical and surgical journals, the only proper medium for such announcements, which are always open for the introduction of every evidence of talent, and where the operator would receive the first, best acknowledgment of his ability. But a quack and his dollar will paste himself on every corner of the streets. The more refined rogue will avail himself of the popular papers of the day, or some ladies' repository, to announce wonders never performed, and abilities never possessed. The still more subtle *nondescript*, refines his duplicity under the garb of mock praise, and condemns the slandering qualities of some venerable dame, he never heard of, who has denounced Dr. So-and-So, and who has determined to abandon the "old school for the more modern and approved homeopathy, hydropathy, or some other undefinable absurdity. What can be more offensive to the man of a refined professional education, and what more distinctive mark can be required to designate men with and without abilities. With this, we introduce two specimens recently received, and give them to our readers for a moment's amusement, but with the sincere hope that such monstrous licenses will be crushed, and that suffering humanity will at last safely rely upon the honesty of its proffered relief. We give the following article entire, from the Boston Medical and Surgical Journal, perfectly agreeing, as we do, with the editorial expression of such things.

How Quacks Advertise.—Below we give part of the advertisement of a notorious individual, as a specimen of the way of doing business among

practitioners of his class. It is quite time their trickery was exposed to the public. We are aware that it is the opinion of many in our ranks, that it is better to let such matters alone; but we must differ from them in regard to the expediency of such a course. A written answer to the following questions is to form the basis of a diagnosis of any AIL a patient may have.

"Give name, age, residence, occupation; family consumptive, or what complaints subject to; where born and brought up; married or single; strong or delicate; lean or fleshy; tall or short, straight or stooping, or deformed; height and size around the waist two inches above the hips; color of hair; complexion; have you any humor, scrofula, cancer, skin disease, head-ache, cough, asthma, rheumatism, or pain any where, loss of voice, hoarseness, catarrh, dropsy, expectorate much, raise blood, fever or night sweats, chills, confined to bed or house, palpitation, nervous, fits, palsy, bad dreams, sour or sick stomach, dyspepsia, flatulence, distress at stomach, colic, all-gone feeling any where, costive, diarrhea, appetite good or bad, piles, fistula, gravel, heat of urine or scanty or sediment? If a lady—married? had any children? any female complaints? irregularity? weak back? pain any where? any bloating? dropsy? bilious? worms? indigent or easy circumstances? any bad fits of sickness? doctor much?

"As it is a source of pleasure to Dr. ——— to alleviate the sufferings of the invalid, he has concluded in future to make no charge for OFFICE consultation and examination of the chest."

The inquiry as to the pecuniary resources of a patient is a very important one, and we wonder the wily doctor should have placed it so near the bottom of the list. It is understood that these questions are propounded to those who may live at a distance, and cannot conveniently visit the great Æsculapius in propria personæ.

Osseous Union of Two Temporary Teeth.—In a note recently received from Dr. Z. M. Kreider of Lancaster, Ohio, is a drawing presenting a labial and lingual view of an inferior central and lateral incisor, with their crowns and roots united. The teeth belonged to first dentition, and were extracted by Dr. H. Scott, dentist, of Lancaster, Ohio, from a German girl, six and a half years of age. Although examples of osseous union of the teeth are not of very frequent occurrence, we have met with several, and there are three, of the temporary teeth, in the museum of the Baltimore College of Dental Surgery, and we have five in our own cabinet. It occurs much more frequently in the temporary than in the permanent teeth. At any rate we have seen some eight or nine examples in the former and only three in the latter. The circumstances connected with the origin and development of the pulps would seem to be more favorable to its occurrence in the one case than in the other, and hence it is, that the teeth of first dentition become more frequently united than those of second.

Dr. Koecker of London, in his "Principles of Dental Surgery," published no longer ago than 1822, expressed his utter disbelief in the occurrence of osseous union of two or more teeth, when, we are assured by Mr. Bell, that at that time, there were several specimens in the museum of Guy's Hospital, which had been placed there some years before, by Mr. Fox.

H.

Medical Appointment.—Paul F. Eve, M. D., for many years Professor of Surgery in the Georgia Medical College, at Augusta, and late of the medical department of the University of Louisville, Ky., has recently been appointed to the Chair of Surgical Anatomy and Clinical Surgery in the medical. department of the University of Nashville, Tenn. Professor Eve is an experienced and able teacher, as well as an eminently skillful Surgeon. The Medical School at Nashville has been fortunate in securing his services.

Ohio College of Dental Surgery.—It will be seen by the announcement of the above institution, that Dr. John Allen of Cincinnati, Ohio, has been appointed to the Chair of Operative and Mechanical Dentistry. We congratulate the school on having secured the services of so good a dentist.

Omission.—In the brief summary which we have given of the proceedings of the last meeting of the American Society of Dental Surgeons, we omitted a resolution offered by Dr. Townsend, and an address which he delivered on the occasion. They were not in our possession at the time we prepared the notice of the proceedings, and when they came into our hands, the printing of the Journal had progressed so far, that we had not sufficient room left for their insertion. They shall appear in the next number.

Dental Times.—We take the liberty to call the attention of our readers to the recent issue of the Times, which has been generally circulated for the purposes and reasons therein set forth. And we beg this opportunity of returning acknowledgments for the flattering reception it has met with from many quarters, even thus early in its existence.

We must also be permitted to mention that an early response to its solicitation for subscription is desirable. We shall endeavor to improve each succeeding number, and give a general summary of all professional miscellanies of common interest.

Its nominal subscription price is so small as to preclude the possibility of pecuniary emolument, but we rely upon a liberal support, both in *subscription* and *contributions*, to enable us to meet our increased outlay and additional labor. A. A. BLANDY.

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ARTICLE I.

Mucous Membrane of the Mouth. By Professor W. R. Handy, M. D.

If there be one tissue of the body of higher relative importance to the practical dentist, than that of any other, it most assuredly must be that of the mucous membrane of the mouth. For, with this membrane is associated every thing of interest and utility connected with his profession. And by its relations with the rest of the tissues, comprehends both the *science* and the *art* of dentistry—the *science*, in demanding as an essential prerequisite, that it shall be studied, and thoroughly studied, in its anatomy, physiology, and pathology, as being the membrane which gives existence to the teeth, forms the foundation of their structure, and involves their several functions and diseases. And in the art, which simply embodies the proper application of this knowledge, in all the practical details relating to the proper management of the teeth.

"I cannot forbear," says Mr. Nasmyth, "from endeavoring to impress upon the minds of my readers, that such a knowledge forms the basis of sound surgical practice, and that without it, the surgeon would be incompetent to perform the

most simple operations on the teeth, with a proper regard for the safety of his patient. The physiology of the teeth teaches us the cause of their shape and arrangement, their admirable adaptation to the office which they fulfil, and the manner in which their function is effected."

The mucous membrane further forms one of the two great divisions of the germinal membrane, the other, being the serous, whose combination, we are told, constitutes the human being in its earliest period of existence—the mucous division forms the minor portion, from whence spring all the organs of nutrition, and belong, in the language of Bichat, to organic or vegetable life, while the outer, or serous portion, forming the organs of locomotion, speech and sense, constitute animal life.

The mucous membrane, in the department of semeiology, furnishes one of the most important keys to unlocking the general condition of the system, as well as reporting every special departure in its own composition, whether that departure be in the color and density of its structure, or in the quality of the fluids of its function, thus furnishing, as it were, a kind of measurement, of the reciprocal influence exerted by this membrane and the system at large, and thereby enabling the dentist to give a practical value to such information, so practical as to tell him the time *when* he should operate, and so valuable as to make him avoid causing any unnecessary suffering to his patient, if no operation be demanded.

This membrane is also the great seat and recipient in the application of foreign agencies to the body, whether these agencies relate to its nutrition on the one hand, in supplying the various materials of nourishment, or to its medication on the other, in being the medium through which, is most generally introduced the different articles of the materia medica.

The mucous membrane in its full development in the teeth, is further turned to practical account by Mr. Sanders, in showing that their successive appearance is a more trustworthy test of *age*, than that of height, or even the testimony of parents, where their cupidity tempts them to sacrifice the health of their children and the truth, by putting them to work in the factories

at an age too young—entirely unsuited to their physical strength, as well as in direct violation of law.

This membrane, also, as represented in the teeth, whose variety of structure the microscope has established, as existing in the various classes of animals, is thought to furnish the most natural foundation for a correct classification of the animal kingdom. And still further to indicate, agreeably to Mr. Nasmyth, "the progressive improvement of the human race." And, lastly, the multitude of diseases to which this membrane is subject, viz. schirrus, cancer, polypus; serous, mucous and bloody fluxes, with inflammation in all its varieties, &c., &c., render it a tissue of extreme interest.

Such are some of the considerations as bearing upon the *importance* of the mucous membrane, which we now propose to examine somewhat in detail, though in as brief a compass as possible, and as having a more especial reference to practical points in which the dentist as well as physician, is mainly concerned.

Mucous Membrane, (so called from the character of its secretion,) it is well known, chiefly occupies the interior of the body, and lines the whole of the alimentary canal, from the mouth to the anus, with the various glandular ducts which pour their fluids into it, also the respiratory canal, and the canals of the urinary and genital systems both of the male and female. It consequently enters as one of the fundamental elements in the great functions of digestion, respiration, urination and generation. It is also styled the *internal skin*, or tegument of the body, in contradistinction to the skin proper, or external tegument, which title seems to be fully justified, both by the continuity, as well as similarity of structure in the two divisions. At all the great outlets of the body, as those of the mouth, nose, anus, vagina, &c., &c., the mucus is traced as a continuous tissue with that of the skin, and further, the identity of the two is observed by the one being readily convertible into the other, as seen in prolapsus of the vagina, and rectum, where the mucus, by being exposed to the air, becomes changed into skin, and the skin, as in the axillar and between the nates

by being kept moist and deprived of air, (as sometimes occurs in children, where cleanliness has not been observed,) assumes the character of mucous membrane. And as to similarity of structure, this will be noticed more particularly presently.

The comparative *extent* of the skin and mucous membrane, may be readily conceded in favor of the latter, when we consider for a moment its two great primary divisions, and but briefly follow the extent of surface which each covers. These divisions consist of the *gastro-pulmonary*, and *gento-urinary*—the former comprising the mucous membrane lining the mouth, pharynx, œsophagus, stomach, and intestines, with all their glandular ducts constituting the digestive apparatus, with that of the nose, larynx, trachea, and bronchia, ramifying in the lungs—forming the respiratory, while the latter extends from the kidneys, lining the uterus, bladder, and urethra, including the organs of urination with the vagina, uterus, and fallopian tubes of the female, and the several organs of the male, embracing those of generation.

Mucous membrane every where, presents the common character of a soft tissue, readily yielding to mechanical violence, easily destroyed by the action of chemical agents, and undergoing, with facility, the process of putrefaction.

The *thickness*, *consistency*, *color*, and *adhesiveness* of this membrane, varies at different points of its course, though all compatible with health, and in perfect harmony with the function which each separate part has to perform. As for instance, the thickness is found to be much greater in the alimentary canal, than in the urinary and genital organs, and greater in the duodenum, stomach, and rectum, than in any other part of the intestinal tube. The consistency equally varies, being greater at the pyloric than cardiac extremity of the stomach, greater in the lower portion of the jejuum and ileum, than in the stomach or duodenum, and much greater in the gums than either the lips, palate or cheeks. The color, if any thing, presents even a still greater diversity, for here the variation is not confined to the different parts of the mucous membrane, but the same part also may exhibit a difference of color, according to

activity of function, and yet be in a state of health, as in the stomach, during digestion, the color is of a brighter red, than when this function is not going on, and is entirely due to the cause of the presence of a much larger quantity of blood, with greater activity of the circulation, than in the quiescent state, and yet both conditions healthy.

Age causes great variation of color. In the fetus it is seen of a deep rose color; in the adult, much paler, and in old age, presenting rather an ashy or grayish hue—in fact, the color seeming to be deep, or otherwise, according to the arterial development. Disease, the kind of death, and various substances introduced into the stomach, change, in greater or less degree, the color of the mucous membrane.

In acute disease, the color will be much deeper, than in chronic, where it will assume rather a palish aspect, from the poverty as well as diminution of blood. In sudden and violent death, as hanging, drowning, &c., the color is seen of a deep red; and substances such as nitrate of silver, logwood, lavender, &c., can each alter the color from its natural state; facts, all of which are highly interesting in a medico-legal point of view. In *structure*, the mucous membrane, though presenting peculiarities at different points, has, nevertheless, some characters which are common to the whole. This membrane is now generally admitted, by anatomists, to consist of three elements, viz. an epithelium, a basement, primary or papillary membrane, and an areolar tissue, containing the blood vessels and nerves.

The epithelium forms the outer layer, and is to mucous membrane, what the cuticle or epidermis is to the skin. It was thought, at one period, to be so partial, as only lining the mouth and œsophagus as far as the cardiac orifice of the stomach, but by the microscope, the epithelium is now satisfactorily traced throughout the whole of the alimentary tube.

It is found to be composed of cells, which, like the cuticle, are susceptible of rapid formation and of as rapid destruction, and consequently obeying the law of constant loss and renewal. These cells, though varying in their form in different parts,

nevertheless perform the common office of protecting the mucous membrane from the contact of foreign bodies, whether dietetic or medicinal, and furnishing a smooth surface by the presence of the mucus, for the ready passage of alimentary material, and the various fluids of the several excretory ducts, without which provision, it does not seem hazarding too much to say, that for all the great practical purposes of health and life, the mucous membrane would not only be crippled, but wholly inoperative. The cells of the epithelium are arranged under three forms, viz. 1. The *tesselated*, or *pavement* epithelium. 2. The *cylindrical*, or *conical*, and 3. The *ciliated*.

The first variety is described as having its cells of various size, flattened, and either oval, roundish or polygonal, and are seen either in one layer or in many layers, placed one above the other. Each cell contains a central nucleus and nucleus corpuscle. This variety is found in the mouth, pharynx, œsophagus, and vagina, and is also seen lining serous and synovial membranes, blood and lymph vessels, and the cuticle likewise, is said to present the same plan of arrangement. The second variety is found to line the whole alimentary tube, from the cardiac orifice of the stomach to the anus—the principal gland ducts—the female urinary, and the male genito-urinary apparatus. Its cells, the microscope informs us, are of a cylindrical, columnar, or pyramidal shape, having their apices resting upon the basement membrane, while their bases approximating, form the free surface. The cylindrical cells are seen to be closely arranged, side by side; containing, also, in each, a central nucleus and nucleolus. The third variety differ rom the second, simply in having the free extremity of its cylinders presenting little processes, termed cilia, and are found upon the mucous respiratory tract—the female organs of generation commencing at the neck of the uterus, and are also seen in the ventricles of the brain. These cilia are represented as in constant vibratory motion, and having their direction towards the outlets of the various canals they line, and designed, it is thought, to favor the motion of the fluids in their natural course, as for example, in

the case of catarrh, to conduct the expectoration towards the outlets of the nostrils and mouth.*

The second layer of the mucous membrane is compared to the rete mucosum of the skin, and is regarded as the formation membrane of the epithelium, beneath which it is situated, and is called the *primary* or *basement* membrane. This membrane is structureless, and is considered by Mr. Carpenter, as forming an exception to the doctrine of Schwan, which makes all the tissues to have their origin from cells—he regarding its formation rather from "a layer of the plastic element."

The third layer of mucous membrane resembles the corium of the skin, though it is not so thick. It consists of areolar tissue, containing white and yellow fibres, also the blood vessels, and nerves, and gives to the mucous membrane its proper support and strength. A fourth element belonging to mucous membrane, consists of glands. These are found scattered throughout the whole mucous tissue of the alimentary tube, and are estimated by Dr. Horner to be upwards of forty-six millions. They are divided into three classes, viz. the follicles of Lieberkuhn, the glands of Brunner, and those of Peyer. The follicles are regarded as simple depressions in the mucous membrane, from whence the mucus is supposed to be furnished. But Dr. Horner regards these follicles of Lieberkuhn, as nothing more than the "meshes" in the veins, which his anatomical preparations present as cribriform in their appearance, and giving the follicular

* To Mr. Nasmyth the profession is much indebted for correct knowledge in reference to the structure of the epithelium. In his late microscopic researches, the scales of Leeuwenhoeck, or the squamous epithelium, as applied to the cuticle, as well as that lining the mouth, he describes as presenting four successive stages of development, viz. "1st. The promotion of nuclei and corpuscles. 2d. That of cells. 3d. The growth of the latter effected by vital imhibition, and 4th. Their compression and gradual conversion into minute lamillar or scales." And that these scales have spaces between them, being connected by a "translucent, gelatinous substance," which he states as having considerable "elasticity," and that the fluid secreted upon the surface of the vascular corium, contains the nuclei and corpuscles, from whence the scales, being the highest stage of development, originate.

aspect, and whose use he suggests as being rather designed for absorption than secretion.

The glands of Brunner are mostly found in the duodenum, and are seen to surround the intestine, in the form of a layer of white bodies, about the size of a hemp seed. They resemble the salivary glands, in consisting of lobules, having excretory ducts, which open into a common tube.

The glands of Peyer are found at the lower portion of the ileum, and are either collected in clusters, called (agminatæ,) or exist alone, and are termed (solitariæ.) The peculiarity of these glands consist in their having no excretory ducts, though they are found to contain mucus, and small vesicles or cells. They are seen to present themselves in circular or elliptical patches, with a slightly raised surface, and from being closed, their precise use still remains a problem.

The *common function* of mucous membrane, like the skin, consists in sensation, secretion, absorption, and in its capacity of self-protection from the action of external bodies. Its sensation, compared with the skin, is dull—its secretion and absorption are much more active, while its protective powers are remarkably great and astonishing, and are derived principally from the presence of a fluid, found every where belonging to this membrane, and called *mucus*. This fluid varies in its composition, as it is obtained from different points of the mucous surface, and in consequence of being mixed with so many other different fluids, its true character is consequently difficult to be arrived at. It is regarded, however, as a viscid fluid, "either colorless or slight yellow, transparent, or nearly so, incapable of mixing with water, and sinking in it." Its peculiar principle is termed *mucin*, which is made to consist of albumen, and, according to the analysis of Berzelius, besides a large quantity of water, contains the muriates of potassa and soda; lactate of soda, with animal matter, soda, albumen and animal matter, and phosphate of soda. In health this fluid is regarded as generally *alkaline*, though in disease often acid. Under the microscope it is found to contain epithelium scales, and granular corpuscles. Such is the nature of this fluid, destined to protect the general mucous surface.

With these remarks upon mucous membrane in general, we come now to inquire a little more particularly into the *mucous membrane of the mouth.* To the dentist, the mucous membrane of the mouth seems to involve the great anatomical specialty with which it is most desirable he should be thoroughly acquainted—but for whose thorough acquantance, he will soon find, that his knowledge must be further extended to the system at large, before he can expect to reap the full benefit to be derived by the practice of his profession.

The mucous membrane of the mouth forms one of the fundamental elements in the formation of the teeth, gums, lip, palate, tongue, tonsils, &c., and is as fundamentally concerned in the first stages of digestion and respiration—likewise in the function of taste, and with the still higher function of speech.

The mucous membrane lines the entire cavity of the mouth, forming loose folds or bridles at different points, as at the upper and lower lips, called (frenum labiæ)—at the under and anterior surface of the tongue (frenum linguæ)—at the englottis (frenum epiglotidis)—and on either side of the uvula, the lateral half arches of the palate constituting the fauces—and is traced continuous with the skin, as before mentioned, on the one hand, and found extending by a similar continuity of structure into the pharynx, larynx, eustachian tubes, the nostrils, the eye, and the maxillary and frontal sinuses.

The mouth, extending from the lips in front to the soft palate behind, and bounded laterally by the cheeks, has its mucous membrane presenting some very interesting and important modifications at different points. It has already been stated to have, with mucous membrane in general, an epithelium, a basement membrane, and a fibro-vascular structure or corium. The epithelium was also further stated to be of the squamous or tessellated variety. Now, upon the lips, this membrane by being exposed to the air, has its epithelium dryer and readily demonstrated. Its glands are numerous, and are found to be of the salivary variety and not muciparous follicles—they are called *labial salivary glands.* They are described as small spheroidal bodies of unequal size, numerous, situated between the mucous

membrane and orbicularis muscle, and opening into the mouth by distinct orifices.

Upon the cheeks, the mucous membrane presents a somewhat similar character, and has its surface raised into projections by a similar series of glands, though of smaller size, lying upon the buccinator muscle, and called buccal glands. There are also two or three glands which open upon the buccal surface of the mouth by separate ducts opposite the last molar tooth, and are called molar glands. These are of the same salivary kind, and differ only by being of larger size, and in being situated between the masseter and buccinator muscles.

Upon the roof of the mouth forming the palatine processes of the superior maxillary bones, the mucous membrane, says M. Cruveilher, "is remarkable for its whitish color, for the thickness of its epithelium, especially in front—for the thickness and density of its chorion—for its close adhesion to the bones—and for the great number of orifices with which it is perforated, especially behind."

Upon the soft palate this membrane presents the two varieties, or rather the three varieties of epithelium—the upper surface or that which looks towards the posterior nostrils, having, according to Dr. Henle the *ciliated columnar epithelium*, like the mucous membrane of the nose—while the lower surface, or that which looks to the mouth, is of the squamous or tesselated variety common to the whole buccal cavity.

Upon the tongue the mucous membrane is remarkable for the roughness of its surface, the (almost cartilaginous) density and compactness of its chorion, of its attachment to muscles, of its being the seat principally of taste, and in its presenting numerous papillæ. The papillæ are seen upon the dorsum of the tongue, and are divided according to their form, into three classes, viz. the papillar *maximæ*, or *calyciform*, situated upon the back part of the tongue, arranged like the letter v reversed, and are the largest in size—2. The *mediæ*, or *fungiform*, next in size, occupy principally the sides and apex of the tongue, and have, says Mr. Harrison, a red color—the 3d class are called the *conical, filliform*, or *papillæ villosæ*—these are .situated

upon the greater portion of the dorsum of the tongue, are very numerous, present a whitish color, have their direction backwards, and give to the tongue its roughness or "brush like" appearance, as plainly seen by the naked eye, while these same papillæ in some of the lower animals, as the cow for example, are exceedingly long, hard, almost horny in their feel, resembling somewhat the rough surface of a rasp, and from their capability of being raised, and having both the forward and backward movement, are well suited as assistant masticating organs, in retaining and compressing the food, as well as giving it the backward direction towards the pharynx.

The papillæ, says Mr. Nasmyth, have a strong analogy in structure to the "pulps of the teeth"—and he continues, "the analogy does not rest here only, for just as the pulps are organs for the production of the teeth, so in some animals, as in birds, the papillæ of the tongue are the source of formation of horny appendages, which perform the offices of teeth, and bear a close relation to those organs." Capillary vessels and nervous filaments, bound together by "areolo-fibrous" tissue and covered by the squamous epithelial investment, compose these papillæ—and the valuable diagnosis which physicians derive from examining the tongue, are regarded as nothing more than the various changes which this epithelium of the papillæ undergo during disease.

Upon the gums, the mucous membrane is so thick and firm as to be called dental cartilage, but the absence of the corpuscles of Purkinje reject the idea of the cartilaginous character, and in lieu thereof, Mr. Nasmyth affirms that the gums "are made up of a mass of scales lying one on the surface of the other"—and that "the alveolar epithelium is thicker in proportion to the youth of the subject examined." The gums are very vascular and can be traced as continuous with the periosteum of the bones.

The last modification of the mucous membrane we have to notice, as connected with the mouth, is that of the teeth—and here, Mr. Goodsir and Mr. Nasmyth have not only shown the origin of the teeth to be from mucous membrane, but have further

demonstrated with surprising minuteness, all the successive stages in their after development—changes so remarkable, that without a knowledge of the fact, one could scarcely credit the truth, that bodies so hard as the teeth, and apparently so dissimilar in every respect to the soft, delicate mucous membrane, could possibly have had any such parentage. The teeth were at one time classed among the bones, but now it is clearly demonstrated that the mucous membrane of the mouth first presents a groove; that, in this groove are seen little eminences, termed papillæ or tooth-germs, that these papillæ grow and are surrounded by a simultaneous growth of the walls of the groove, constituting first the follicle, and when closed, next the sac of the tooth—thus making the three stages of a tooth to consist in a papillary, follicular, and sacular, to which is added its eruptive, stage. Now Mr. Nasmyth makes the following observation in reference to this remarkable modification of the mucous membrane, as connected with the teeth, which we beg leave to quote: "The first trace, he says, of the future tooth, the dental papilla, is originally a part of the mucous membrane—subsequently, however, when the papilla is somewhat further advanced in growth, the two tissues are entirely distinct, the former being almost wholly composed of corpuscles or cells, the latter maintaining its fibrous character. At a later period the structure of the pulp is still more characteristically different from mucous membrane, while the internal surface of the capsule has become a serous rather than a mucous membrane. And, at this stage, its surface is invested with a very delicate layer of cells, totally different from those of epithelium."

With this account of the mucous membrane of the mouth, we will in addition add, that it receives upon its surface the salivary fluids, and is most liberally supplied with blood vessels and nerves.

The saliva comes from the six salivary glands, three on either side of the mouth, viz. the *parotid*, *submaxillary* and *sublingual*, the former supplying its fluid to the molar teeth, while the two latter supply those of the canine and incisor. The *blood vessels* for the lips and cheeks come from the coronary arteries of the

facial, a branch of the external carotid, and the *buccal*, *infra-orbital*, *alveolar*, *mental* and *masseteric*—all branches of the internal maxillary, which also comes from the external carotid. The palate, gums, teeth, and tongue are supplied pretty much from the same source, the palatine arteries going to the palate, the superior coronary to the gums of the upper, and the sub-mental and sublingual to those of the lower jaw, while the superior, inferior dental, and infra-orbital go to the teeth. And the lingual, palatine, and inferior pharyngeal to the tongue. The veins correspond very closely with the arteries as to name and direction, and do not require further notice.

The nerves supplying all these various parts come principally from the 5th, 7th, 8th, and 9th pair.

The last point we propose to notice, is, the several *relations* of the mucous membrane of the mouth.

These may all be classed under three heads, viz. 1. The physical. 2. The organic, and 3. The mental.

The *physical*, are those which this membrane has with atmospheric air, our food and drinks, and the salivary fluids with which it is brought in contact, when introduced into the cavity of the mouth.

The air, it is known, has to pass through the mouth in its passage to the lungs during respiration. Now this air, in respiration, will carry to the lungs through the mouth, in contact with its lining mucous membrane, all the impurities with which it may be loaded from without, and return in expiration, in the same way, surcharged with deleterious properties which must be expelled from within, so that if the air should depart very materially from its natural healthy, or physiological condition, the mucous membrane of the mouth will be in danger of suffering in proportion to such departure, and the general condition of the system. Food, by remaining in the mouth, may undergo chemical decomposition, and develop corrosive agencies which may destroy the teeth and gums, as well as the other portions of this lining membrane of the mouth. The salivary fluids, though secreted alkaline in health, are, nevertheless, we are told, during fasting, acid, and then if we add to this the acid mucus of the

mouth, which is said to be the case during disease; we have thus a combination of agencies capable of acting upon and injuring the best denture, while in one which is bad, ruin must be inevitable, if this state of things be not arrested by proper treatment.

The *organic relations* of the mucous membrane of the mouth are strikingly obvious, and most especially that portion covering the tongue, if examined when the general system is laboring under disease—for, here we find, as upon a tablet, that the stomach and liver, with other organs, report their complaints, and expect to find a sympathy of feeling in their behalf.

And here also it is, the physician invariably looks for his most valuable diagnosis, into the condition of distant organs, by simply inspecting the various appearances of the mucous epithelium as indicated upon the tongue—so also with the gums, the teeth, and every other portion of the mucous membrane of the mouth, each having more or less relation with the various organs of the body.

The brain, standing as the instrument and representation of the mind, constitute, what we have thought fit to term, the *mental relations* of the mucous membrane of the mouth.

It is well known that the mind has great influence in increasing, suspending, and altering the secretions—while on the other hand, tooth-ache may so irritate and fret the mind as to amount almost to partial insanity—and further, that if the teeth, palate, and other parts are wanting, the mind, having no medium of communication, is, so far as speech and articulation is concerned, silent and completely lost—and lastly, viewing the brain simply as an organ in sympathy with the mucous membrane of the mouth and the teeth, we see how these latter, in teething, will, through the fifth pair of nerves, so powerfully act upon the brain as, through it, to often throw the child into the most powerful convulsions, by expending its fury upon the muscular system.

ARTICLE II.

Resolution and Argument offered at the Last Meeting of the American Society of Dental Surgeons. By ELISHA TOWNSEND, D. D. S.

Resolved, That the objects avowed by this society, at the time of its organization, and the purposes of its founders, were all right, necessary and well-timed, and the measures adopted, honorable, expedient and successful; that, eleven years' experience, fully justifies the hopes entertained of its agency, in advancing the interests of the science, and elevating the general reputation of the profession; and, that its present condition and duties, and its prospects of usefulness, commensurate with its capacities, alike, require an enlargement of its sphere of action, an increase of energy in its efforts, and of freedom and liberality in its spirit.

MR. PRESIDENT:

This society is now eleven years old. It is the oldest of the national associations of this country, formed for the advancement of the various branches of the healing art. It claims the high honor of being the pioneer, in this tract of professional enterprize. Its founders felt so sharply the necessity, and saw so clearly the advantage of professional community, that they ventured upon the untried principle, in a confidence, equally creditable to their intelligence and their zeal. All honor and thanks to them, that we witness, to-day, the happy fulfilment of their generous hopes. Their experiment is our experience, for, the PURPOSES of our organization, so far as time can fulfil them, are already eminently answered. Dr. Horace H. Hayden, the father of our society, and its first President; a man, sir, who was gifted with that prophet-like constitution of mind, which enables its possessor to *foresee* the *results* of great enterprizes, as clearly as their humbler agents can see them, when they arrive; and was, moreover, endowed with that energy in action,

which is as essential as insight, to the character of hero and reformer.

Dr. Hayden, sir, when the handful of leading spirits, were assembled at New York, to adopt our constitution, said, that he had resolved, the time should come when the profession and *name* of dentist should be honored, and in the address, which he delivered before us, here, in Philadelphia, at our second annual meeting, ten years ago, in answer to the question, "what rank shall we assume?" replies, in the confidence of inherent right and actual desert, "we assume the title, and claim the privileges, (hitherto denied us,) of being the studious, diligent and successful cultivators of at least one branch of the science of medicine." And, looking forward to the happy working of all the agencies, then enlisted, and among which, he held this society a most important one, he promised our profession, an "elevation that shall command the respect, not only of its own members, but of the medical faculty in every part of the world." I need not refer, now, to the evidences; for the fulfilment of this scripture, is seen and known of all men. The name of dentist *is* honored, the respect of the faculty *is* secured, and our profession is fully recognized, as a legitimate and honorable branch of the great medical family.

It is the agency and capability of this society, which the resolution presents for remark, and I turn from the happy and proud contemplation of our position, in the world of science, to a brief consideration of our societary relations, and the duties growing out of them. In reference to the agency of our association, it seems to me, sir, that its designed efficiency in the improvement, and advanced reputation of our profession, cannot well be questioned.

It is not necessary to the establishment of such claims, that it should be credited with the exclusive, or even a principal share, among the causes of the general prosperity, for which it has been laboring. It is enough to say, that intrinsically, it is capable of a noble service in the cause of scientific progress and professional education, and that it has been, during these years, faithfully and earnestly employed, upon its mission; that

it has been busy with the interests, and alive with the sympathies of the great work, and has kept itself abreast of every forward step of the great advancement made, and still stands ready, and fully capable, of all those next steps in progress, which lie before us.

There is great pleasure in the retrospect of such an enterprize as ours. Its mistakes and imperfections are as nothing, in the average of good which it reports for the past, and promises for the future ; nay, such mistakes and imperfections, are the instances which prove the rule, for they show the strength of the principle which could accomplish its aims against all impediments in its subject, and their hindrances besides. A society which had our work to do, and can report such progress as we this day witness, has justified its existence, and deserves the place it occupies, and must, also, be as capable of its future promises, as of those which it has already fulfilled.

Well do I know, that the infancy of all things human, as well as of the human animal, is liable to disease and disturbance, and we can afford to confess the common infirmities for ourselves, for we have lived through them, and have escaped with a sound constitution, and have all the advantages of large and various experience for our future direction.

The early years of such a movement, are entitled to the benefit of this justification or apology, as either may be needed, to cover the complaints of enemies, and the regrets of friends. Childhood is usually a hard struggle for the maintenance of the individual life, and that of our society was one of the hardest. The preamble of our constitution gives conspicuous place among the motives of the organization, to the necessity then felt, of giving "character and respectability to the profession, by establishing a line of distinction between the truly meritorious and skillful, and such as riot in the ill gotten fruit of unblushing impudence and empiricism."

Dr. Hayden, in his characteristic way, compared the mischiefs then to be combated, to "a new race of Canaanites, which must be expelled from our borders." In such circumstances, the chief and highest functions of a young society, like

those of human infancy, lie somewhat in advance, awaiting self-adjustment, and more mature conditions for their perfect performance. Yet, even an absorbing care of itself, is in some sort, a necessary fidelity to its prospective purposes. Accordingly, the effort to vindicate and preserve our character and caste, was a leading impulse, and exacted the utmost vigilance of our early membership.

Just then, there was nothing more important, and nothing so immediately pressing; and the error of excess in that direction might be expected, and will, in all candid judgments, be excused. Qualifications for membership usually figure largely in new constitutions; and exclusiveness in the spirit of their management, when it has a warrantable jealousy for the common honor to justify it, is apt, besides, to find many occasions and strong impulses, in the pride and prejudices of opinion, common to all men of strong and decided quality.

Indeed, it is not only a pardonable, but almost a graceful fault, this overweening pride of position, and care for character honorably earned, to be usefully exerted; but it is, also, so natural and plausible, that there is no danger of its *undue* slackness, and there is the less necessity for special care in its maintenance. The time comes to such a society, as to the child with which we compare it, when it may be trusted without extraordinary securities, and may encounter nearer contact with the masses, under the protection of its real strength, and the acquired reputation of it. Besides, it must be recollected, its ultimate business is with the masses, and it must fulfil its vocation, at all events, for, as Dr. Johnson said to the idler, who begged a shilling from him, on the grounds that he *must* live, "that necessity is not so clear as you seem to think, for one that does nothing he was intended for."

The resolution now before us, refers with just pride, to the influence of our society upon the general interests of our profession, but, I do not propose the argument of this proposition, as if it were in controversy, nor do I urge it for the mere purpose of asserting its claims upon the regard of the public, professional and non-professional. I acknowledge, that I feel my

full share of pleasure, in the honorable attitude which it occupies in the scientific world, and a happy confidence in its well proved powers of usefulness, but it is for the sake of those powers, and the hope that there is in them, that I would assure myself of its worthiness and rejoice in it.

My impression is, sir, that beside and after all that individuals can do in discovery and improvement, and in the propagation of such improvement through the means of private pupilage—after all that our excellent Dental College can do, in giving the highest educational advantages to their public classes, and after, and besides, all that our invaluable dental periodicals can achieve in the collection and circulation of professional knowledge, and in exciting its development: there still remains important and appropriate work for organizations such as ours, whether they be national or state, or limited to lesser districts; and, that their importance is also in proportion to the extent of territory, and variety and number of members which they embrace. All the formal methods of education mentioned, have their special adaptation to use, and none of them can supply the place of another, nor take rank of it in importance. Each in its own way, is alike necessary to the general end; but they all lack what a national organization of practitioners is capable of supplying; they want that combination and unity, and that attitude of supervision, in virtue of a general representation, which serves to ascertain the idea, and direct and sustain the drift of professional advancement.

The private instructor imparts to his pupils, along with the elements that are common, all that is peculiar and individual in his own notions and methods, but without the criticism and connection of a broad comparison with others. The college teaches through its men, selected for their eminence and ability, all whatsoever can be so taught and received; but the period of technical pupilage and primary education stops, aye, stops at the very threshhold of the profession. Our periodical papers are indeed invaluable masters in the work of that mutual or second education, which adepts can interchange with their equals; but with all the reciprocity of instruction, and facility of communi-

cation which they possess, and which gives them their great value, they yet lack the peculiar power of the associative principle, and that superiority of influence which the personal communion of *men*, has over the mere communion of mind through intermediate channels. Authorship and direct intercourse touch their subjects very differently; writers, while they teach readers, derive for themselves from their responsibilities, all the training and influence of scrutiny and trial at the bar of opinion, but the readers, who need such influence most, escape it, and in escaping, lose all the benefits of emulation; for between them and their book makers there is no sort of competition, and no mutuality. But personal contact in associative movements brings the men of both classes together, and excites them equally with all the force of a full responsibility of all parties, to the same expectations and duties.

It provides for such equality, and provides for such reciprocity of relations, as must act upon the younger and inferior in the happiest manner, while, in fact, it gives the tone and pitch of the highest and best to the whole fraternity. Men balance better when they meet in person, than when they stand edgewise to the world to show only their strongest points; and the challenge to equality of average usefulness, comes, graced and commended among professional men, (otherwise differently distinguished,) by those amenities of personal intercourse in which, at least, every respectable man has as much to give as to receive from his neighbor, and by all those other differences between men that make the most common necessary to the completeness of the most distinguished. You, Mr. President, for instance, have a potent voice; but I have a testing vote—you have an advance idea, I have a correcting experience—you have shining talents for speculation, I balance you with eminent opportunities for observation; and so the man that makes a figure exchanges dependency with the man most conversant with facts, and the great balance holds the truth and the excellence of all, for the use of all. Moreover, there is in the feeling of this fellowship in the highest things, the turn of another coil of the great chain of sympathy, which holds men to the highest apprehen-

sion of their professional duty, and to the faithfulest performance of it. Again, an association of the mature men of a profession, has another use, that works wider than its own limits, which is well worthy of our regard. It affords the non-professional public a pledge of guardianship over the general interests, and secures for the profession the confidence that the known watchfulness of all for the benefit of each, is calculated to inspire. Every one feels sure that men, so related to each other, must not only contribute of their best for their credits' sake to the common stock, but must, in the spirit of such emulation as they have, whether generous or selfish, study and strive to make it as worthy as possible of acceptance and display. In every way, indeed, the blessing of human brotherhood, and the force of universal helpfulness, are in it. Empiricism of every grade and form is expelled by the liberal spirit of fraternity; and selfishness and individualism, caught in their own craft, gladly throw open their doors to exchange their farthing rush-lights for the broad sunshine of the open day; and over all, like a general providence, or a controlling destiny, opinion, which it moulds, leads all effort and aspiration by settling all pretension in science by the highest ideas which get general allowance and authority before the public. Such are some of the capabilities of association—very imperfectly arrayed—very feebly expressed, but imposing enough in any presentment to justify all we claim for it.

And now it remains for us to make it yield the highest results of which it is capable, and to effect this, we must make the policy and spirit of the movement correspond to the purpose, with such *liberal* accommodations to the condition of things around us, as the great principle of our enterprise will allow. I speak as I have heretofore spoken—encouraged by the kindness of construction, and the ready sympathy and support accorded to me by my brethren. I speak for the enlargement of our borders, the extension of our influence, by every means that can favor such ends, and with as little restraint and scruple as self-respect will, in any wise admit. The profession boasts a large number of worthy practitioners, who have never

been in membership with us, though we are on the best terms of personal respect and professional intercourse with them: now there is nothing in our constitution, or in the terms of communion, which should bar out a single legitimate practitioner of dental science in the United States. We are not a close corporation of conservatives, but in spirit and in fact, a company of men zealous for progression, and free in our relations and movements, as the love of truth and progress can make us. We are conscious of no intended impediment to the widest, broadest, freest participation with us by all the regular brotherhood of the profession. But, if we are misapprehended in our design, or held delinquent in any duty or courtesy, which might make our association more attractive, it is right for us to remove all misapprehension by the most explicit manifestation of our cordiality to the fraternity, and by earnest action in accordance with it. The resolution submitted, seems to me appropriate for the purpose of such declaration, and the general demand of the membership will most unquestionably illustrate and sustain it in practice. Closely connected with our sentiment and bearing, as a society, towards the dentists of the country, not in connection with us, is that of the conduct of the older and more distinguished among us, in their general professional relations with the younger and less eminent practitioners of our art. This topic does not directly rise out of the resolution, though it has some relevancy, and it may even be pressing quite to the verge of my license, to touch it, however respectfully in spirit and manner.

But, I have always found the candor and forbearance of the men whom I am now addressing, quite worthy of the earnestness with which they were approached, and I am emboldened thereby to put my brethren to the question upon this point. Have we as cordially as we might, kept open, wide open, the approaches that secure confidence and fraternity between all the grades and varieties of professional men? The best methods of education on dental science and art, have not been long open to any, and are not yet conveniently accessible to all. Moreover, our profession, in all its branches, is not to be fully

learned by the ordinary opportunities which the best private practice can afford to the pupil, and from other causes besides, young men capable of the best things, as well as others less worthy, must needs enter upon business, in a condition of comparative incompetency: now, it is required of us all, every one of us, to answer, whether we have been considerate and kind enough in the premises; whether we have magnanimously laid aside as much of the difference which better opportunities and greater experience has fortunately afforded to us, as would reconcile them to us, and fit us for our duty to them, and so meet them in the liberal spirit that real superiority always wears, when it is also above selfishness, pretension and fear. I have spoken of association on the larger scale which the American Society presents, and I would now gladly press the value and duty of private professional association, to the full extent that freedom of communication between neighboring practitioners would require, and for the purposes of the frankest intercourse and interchange of observation and mutual instruction. The difficulty and delicacy of such freedom are not so great in our department, as in that of medicine, and some of the operations of general surgery, for our patients are not in sick rooms, but we can make appointments to meet our own convenience, and postpone treatment sufficiently to bring good cases into use for the common benefit: we can select our cases, and appoint our times almost at will—and there is nothing to hinder periodical reunions of men in full practice, with their young friends, for opportunities which could be made available and invaluable to all parties, and most so to him that imparts the most. In a word, let us liberalize our professional relations—enlarge and enrich its brotherhood, and give the *heart* of the man its natural place and power through the whole range of the relations and duties of our professional vocation. And now, sir, while the ideas and aspirations appropriate to these views of the cultivation of our science, are all aglow with the fraternal feelings which they so thoroughly awaken, permit me, as one of the committee of arrangement for the meeting of the convention, to bid the American Society welcome to our city, and to assure

them of an earnest and cordial hospitality, in return for the high gratification which their presence affords to their friends, professional and personal, in the city of brotherly love.

ARTICLE III.

On the Preservation of the Teeth. By H. L. JACOB, Esq., M. R. C. S., &c., England.

IN the course of my practice I have continually had occasion to deplore the ravages which disease has been permitted to make in the mouths of even young persons, especially young women; and have remarked, that although in some cases this may be traced to carelessness or indifference, it proceeds, in the majority of instances, from sheer ignorance of the nature and extent of the resources of dental surgery, and of the circumstances under which professional assistance is most required and most successfully employed. It is with the hope of diminishing, in some degree, this unfortunate ignorance, and of making it clear to persons of all classes, that it is in their power to save themselves a vast amount of pain, distress, and inconvenience, by a little timely attention, that I am induced to bring these pages before the public.

The evils attendant on the loss of the teeth, must be pretty obvious to all; an unsightly appearance, an aspect of premature old age, from the falling in of the lips and cheeks, lisping and other imperfections in the articulation of the voice, injury to the health, resulting from the imperfect mastication of the food, and the continual presence of pain and irritation about the mouth; all these, as well as the suffering, inconvenience, and personal discomfort which disorders of the teeth occasion, are so palpable and evident, that it might, perhaps, be deemed superflous in me to inculcate the prudence of taking pains to avoid these evils; but I would insist on a point which is, perhaps,

not quite so obvious, namely, that it is not only very foolish, but also very *reprehensible*, to neglect the state of our mouths. It is a positive duty we owe to society to avoid, as far as possible, giving offence to the senses and feelings of others; and what can be more disgusting than a display of swollen ulcerated gums, and a parcel of black ragged remains of teeth in various stages of decay; or a foul incrustation of the accumulated secretions of years, enveloping the teeth and gums in one general mass of filth, and tainting the air with the most noisome exhalations? I maintain that persons have no right to shock our senses by these offensive exhibitions, and thus make themselves nuisances to society, when it is in their power to avoid it; and there are very few, in this part of the world at all events, who do not possess that power. It is useless to say the poor creatures cannot help being afflicted in this manner; in all cases this state of things admits of improvement, and in nearly all it might have been prevented altogether. Many, as I stated at the commencement, suffer in this way through ignorance; it is high time, then, that they should be enlightened on this point; as for those who wilfully allow their mouths to get into this filthy condition, if they are not to be acted on by a sense of delicacy and propriety, they may, perhaps, be deterred by a sense of *shame*, from incurring the charge of uncleanliness, a fault which society is very quick to perceive, and very slow to forgive. In individuals of the fair sex especially, such neglect is unpardonable; it renders repulsive an otherwise pleasing and attractive person, while there is no feature more agreeable and prepossessing than a good clean set of teeth; in fact, to borrow the words of a French author, "with bad teeth no woman was ever beautiful; with good teeth no woman was ever plain."

I shall now proceed to offer a few words of advice respecting some of the commoner and more important disorders of the teeth, with the means to be adopted for relieving or preventing them, and endeavor to correct sundry erroneous notions which I have observed to prevail very generally on these subjects; not with a view of giving the public any instruction in the art of dentistry; an attempt to do this in a small pamphlet, even

were it desirable, would be useless and ridiculous; but simply that people may have some idea of what dental surgery can or cannot do, and no longer, on the one hand, deprive themselves of the benefits which science has placed at their command through ignorance of their existence, nor, on the other, feel so much confidence in the resources of the dental surgeon, as to expect something like a miracle to be performed on their behalf.

First, then, for that commonest of all disorders of the teeth, CARIES OR DECAY. This, which is so well known as to need no description, is by far the most frequent cause of the destruction and loss of the teeth, and almost the only source of genuine *tooth-ache*, the tortures of which most individuals have experienced at some period of their lives. Now, of the many thousands of teeth that are annually lost from this cause, there is scarcely one that might not have been preserved by proper care and attention; and I am convinced that if this fact were more generally known, people would not be content, as so many now are, to let their teeth go on decaying year after year, and subjecting them to continual pain and inconvenience. I would urge more particularly the importance of having the teeth attended to in early life, that any defects or irregularities in their growth may be at once detected and rectified before any permanent mischief has been produced; it is surely inconsistent with common humanity to neglect such simple means of preventing so much subsequent distress and suffering to the rising generation; and I would suggest to all parents the propriety of having their children's mouths examined by some respectable practitioner in dental surgery, or, at all events, by their medical attendant, as soon as the teeth of the second set begin to make their appearance. If, on examination, it is found that every thing is going on right, they will have the satisfaction of knowing that such is the case; if, on the contrary, there should be some defect which requires to be remedied, they will have the happiness of reflecting that their child has not suffered through their neglect. This examination should be repeated two or three times a year, in some cases oftener, during the whole period of the shedding of the teeth. One important rea-

son for this attention, is the fact that the teeth of the second set being in general much larger than those of the first, it frequently happens that the jaws do not undergo an increase of dimensions sufficient for the increased space required by the teeth; these are consequently crowded and pressed together with great force, which bruises and crushes their structure; and this, not to mention the unsightly appearance and other inconveniences often produced by the teeth overlapping and growing out of their proper place, is *one of the commonest and most fertile sources of* DECAY; it is to this point, therefore, that I wish more particularly to direct attention, as especially connected with the subject now under consideration. I have seen numerous instances of persons who have lost nearly all their teeth while still young from this cause; now surely it would have been very much better to have prevented this misfortune—and it might in all cases have been prevented with very little trouble and at a trifling cost. It is not only during childhood, however, that means should be taken for preventing the destruction of the teeth by decay; teeth may decay at any period of life, owing to certain original defects in their structure, to uncleanliness, to an unhealthy state of the secretions of the mouth, or of the system at large, &c., as well as to the injury inflicted on them by being over-crowded; and in all cases after decay has commenced it may be arrested and completely remedied, if attended to before it has penetrated deeply into the interior of the tooth; as it generally happens, however, that the individual himself does not become aware of the existence of the decay until it has made considerable progress, frequently, indeed, not until it is too late to remedy it, and as it is of importance that it should be taken in hand at an early stage, it will be prudent for all who wish to preserve their teeth and escape tooth-ache, to have their mouths examined once or twice a year by some dental surgeon, in whose skill and integrity they can confide, in order that any decay which may exist may be discovered and remedied at once. It is a common thing for persons to say, "there is nothing the matter with my teeth, I never have any pain in them, when I do I will go and have something done."

Now, if they wait until they begin to suffer from tooth-ache before they apply for professional assistance, they will, in nine cases out of ten, apply too late for the preservation of the tooth, or, at all events, too late for any means to be employed for that purpose with any *certainty of success;* and this fact cannot be too much insisted on. Every body is ready to admit the truth of the maxim, that *prevention is better than cure*, yet, strange to say, some persons seem to prefer to suffer continually from tooth-ache, and to lose their teeth one after another, after putting themselves to much trouble and expense in fruitless attempts to *cure* the pain, rather than have recourse to means which would have *prevented it altogether*, and saved their teeth into the bargain; people inquire eagerly for nostrums to *cure* the tooth-ache, but few appear to be at all solicitous about *preventing* it.

I have said that the progress of decay in a tooth may be arrested, and the injury effectually remedied, if it be taken in hand at the proper time; this is effected by the operation of STOPPING, as it is termed, which consists in removing the whole of that portion of the tooth which is softened by the decay, and filling up the cavity completely with some hard incorrodible substance, so as to entirely exclude all air and moisture; when this has been properly and skillfully done, the tooth is to all intents and purposes as good as if it had not been decayed at all. The material best adapted for this purpose, generally speaking, is gold, prepared in sheets or leaves; a piece of this gold foil, of the proper size, is folded or rolled up into a convenient form, and pressed gradually bit by bit into the cavity, until it is completely filled, the gold being packed and pressed together in one solid mass, moulded to the shape of the hole; silver foil and pure tin foil are sometimes used, but gold is to be preferred. It often happens, however, that owing to certain circumstances, such as the situation of the decayed part, or the great loss of substance which the tooth has undergone, &c., this mode of stopping cannot be employed; a sort of metallic paste or amalgam is then used, which is introduced into the cavity in a soft state, and in a short time *sets* or hardens in the tooth; this is a

very useful kind of stopping, as it can be moulded to any shape, and thus may be used when a very large portion of the tooth is decayed and broken away; there are various kinds of these metallic pastes, some more useful than others; they are all liable to this objection, that they are apt to become more or less discolored after a time, and to give the tooth a dark disagreeable appearance; where the tooth is out of sight, however, this is of little or no consequence. Some of these substances, under the names of "mineral cement," "succedaneum," "enamel," &c., are advertised extensively by certain ignorant or unprincipled individuals, and sold to the public to enable persons to stop their own teeth and *cure tooth-ache;* and much mischief is thus produced. Some of these substances would doubtless answer very well if properly used; but whatever be the material employed for stopping a tooth, it is absolutely necessary for the success of the operation, *that all the decayed part should be completely removed first;* in many cases it is impossible for any person to do this for himself, and in all cases proper instruments and apparatus are required for the purpose, together with a certain amount of skill and practice in their use; when the tooth is not properly prepared in this way, the decay generally goes on as bad as ever, in some cases even more rapidly than before; moreover, a considerable degree of care and nicety is generally required in the introduction of the stopping; various inconveniences result from its being done in a clumsy manner, and thus, not only is the tooth not preserved, but positive mischief is often occasioned besides: this is not all however; in many instances the cement or "succedaneum" is not inserted into the tooth until it has begun to ache; in this case the pain is generally increased to a tenfold degree, and the patient is obliged to have the tooth extracted to escape from the agony; in some cases the already inflamed nerve is so irritated by the stopping, that matter forms inside the tooth, abscesses arise in the face, other teeth besides the one originally affected are lost, and even portions of the jaw destroyed. In addition to these direct evils, other indirect ones are produced; persons being led to believe that they can stop their teeth and cure tooth-ache so nicely them-

selves, are lulled into a false security and prevented from having recourse to the proper means for preserving their teeth; and when they find that they have been deceived by the delusive advertisements, sometimes conceive a prejudice against the operation of *stopping*, and take for granted, that because their own ill-advised and imperfect attempts have failed, it is never of any use to have teeth stopped at all; and thus deprive themselves, and perhaps their friends, of one of the greatest benefits that science has conferred on mankind.

A decayed tooth ought to be stopped before the decay has penetrated to the central pulp or *nerve;* when the nerve is exposed, it is too late to have recourse to the operation of stopping with a reasonable prospect of its being permanently successful; it is true that many teeth are stopped under those circumstances, after the nerve has been first destroyed artificially, or has decayed away of itself, and with perfect success, but there is no certainty about it; it not unfrequently happens that the tooth becomes very painful afterwards, and the stopping has to be removed or the tooth extracted; this sometimes occur soon after the operation, but it may be brought on at any time by exposure to cold or some derangement of the general health: sometimes a succession of small abscesses or gum-boils takes place, or the tooth is continually tender and uneasy: this is, of course, very unsatisfactory both to the patient and to the operator; besides the operation of destroying the nerve of the tooth is generally attended with a great deal of pain, and this is another reason why we should take care to have our teeth stopped before the nerve has been exposed, as we shall then avoid this painful process.

As tooth-ache, in almost every instance, arises from the exposure of the nerve by decay, it is evident that when a tooth has begun to ache severely, the chances of being able to preserve it are very much diminished, if not altogether lost. The operation of stopping, when performed at the proper time, is generally attended with little or no uneasiness; but it sometimes happens that a tooth will be somewhat tender and sensitive, when the decay has made as yet but little progress; and

the touch of the instrument used to cut away the decayed part, occasions then more or less pain; this is very different, however, from the acute pain that is felt when the nerve is touched; and when the tooth has been restored to a healthy condition by the unsound part being removed, and the cavity properly filled, this tenderness gradually subsides and passes away altogether. When, in consequence of the extreme tenderness of a tooth, it cannot be stopped with any hard metallic substance, some softer material, such as gum mastic, or gutta percha, may occasionally be employed with advantage, as a temporary stopping. I have alluded to *want of cleanliness* as one of the circumstances giving rise to decay of the teeth; when *tartar* is allowed to collect around the teeth, it serves as a reservoir for unhealthy secretions, sour and putrid remains of food, &c., which corrode away the teeth slowly but surely; the decay sometimes goes on so insidiously beneath the coating of tartar, that the teeth are nearly cut through by it before the person is aware that there is anything the matter; there are other evils resulting from neglecting to clean the teeth, which I shall mention presently, but this alone ought to be sufficient inducement for every one to keep his teeth as clean as possible. Some persons, in consequence of decay in their teeth having been brought to light by the tartar being removed, have imagined that the teeth decayed *in consequence* of the removal of this substance, and say that they never know what it was to have decayed teeth until they had them cleaned; very likely they did not *know* that they had decayed teeth, but it is no less true, that the mischief had been going on for some time previously. A man, who on looking at himself in a glass, discovers that he has a dirty face, might just as reasonably maintain, that his looking in the glass was the *cause* of his face being dirty. It happens sometimes that the teeth decay away very rapidly, in consequence of an unhealthy state of the constitution, the secretions of the mouth being acid and unwholesome, and the teeth at the same time in a weak state, and less able to resist the corrosive action; in this case, we must not confine our attention to the teeth themselves, but must take proper means for

restoring the general health. Before quitting the subject of decay of the teeth, I may as well say a few words on TOOTH-ACHE. I have frequently heard persons express a wish that some cure could be found for tooth-ache; well, there are a great many remedies for it; but, setting aside the extraction of the tooth, there is no one plan that will answer equally in all cases; the treatment of this, like that of any other ache or pain, will depend on the circumstances of the case,—an application which, in some instances, acts like a charm, and gives instantaneous relief, will, in others, be perfectly useless, or even aggravate the evil. Sometimes all local applications will be useless, the tooth-ache being kept up by a disordered state of the system, for which the proper remedies must be employed. But if the *cure* of tooth-ache be troublesome and uncertain, we have the satisfaction of knowing that its *prevention* is by no means so. By taking care not to allow the teeth to be crowded and pressed together, by keeping them clean, by not using them for improper purposes, by taking plain wholesome food, avoiding an excess of acids or sweets, and by maintaining a healthy condition of the digestive organs, we shall almost always prevent the teeth decaying at all;—but, if decay should take place, we have it in our power to arrest its progress, prevent tooth-ache, and preserve the tooth, by a timely recourse to the operation of STOPPING.

The condition of the mouth properly known as "SCURVY OF THE GUMS," although not so common as the disease we have have just been considering, is yet frequently met with, and occasions much suffering and inconvenience. This complaint varies a good deal in different cases; in fact, there are, in all probability, several different disorders comprised under the popular term "SCURVY." In some forms of it, the gums are soft, spongy, and swollen—in some instances so much so, as nearly to cover the tops of the teeth;—this is generally accompanied by a large deposit of tartar, and, not unfrequently, by the secretion of a foul, acrid, offensive discharge;—this condition may generally be remedied without much difficulty, but if allowed to go on, it occasions the destruction of the

teeth, which either decay away, or gradually loosen and fall out. Another variety of this affection consists in the gradual detachment of the gums from the teeth, apparently without the former being diseased—the disorder consisting in the destruction of the *periosteum* or membrane which covers the root of the tooth, and by which it is attached to the gum and to the bony socket—together with the absorption, to a certain extent, of the bony socket itself, so that an instrument may be passed quite round the root of the tooth, between it and the gum, to a considerable depth ;—this separation of the tooth from the surrounding parts, goes on until it drops out altogether, or until the pain and irritation it occasions, obliges the patient to have it removed. The tooth in these cases is very loose, moving freely in all directions, and acts like a thorn in the flesh, keeping up a continual irritation in the jaw, and occasioning excessive pain each time it meets with a sudden jar or shock. This disease sometimes attacks nearly all the teeth at once, sometimes only one or two, and occasionally a tooth is only partially affected by it, one side of the root (or one of the roots, if there are more than one) being still firmly attached, while the other is quite separated from the surrounding parts. It appears to depend, in some instances, on a certain peculiarity of constitution, which is often hereditary,—in others, it is brought on by salivation from mercurial medicines,—by want of cleanliness,—by the use of hot, stimulating food or other injurious substances,—by derangement of the stomach, liver, &c. ; and two or more of these causes may co-operate at once ; but I have observed it to occur most frequently when the teeth had been more or less *crowded* in the jaw, but, owing to their strength and soundness, and the healthy state of the secretions of the mouth, and the constitution generally, had not undergone decay, but had remained perfect :—in these cases, although the teeth themselves escaped, the injurious effects are felt in the jaw ; and persons who had congratulated themselves on having preserved a complete set of teeth up to the middle period of life, have then been astonished and dismayed at finding them loosening and falling out one after another in quick

succession. This furnishes an additional reason for taking steps in early life to prevent the crowding of teeth;—by the help of this and other precautions, we may succeed in preventing the disease from coming on, and by the application of appropriate remedies, it may often be checked after it has commenced; but that portion of the root of the tooth which is already separated from its attachments can never reunite itself to the gum; all we can do is to prevent the mischief from extending farther. When only one or two teeth are affected, they may, in some cases, be tied to the adjoining ones, provided these are firm and sound, by ligatures of fine gold or platinum wire:—the teeth are thus kept steady and rendered much more serviceable and comfortable. When the teeth are fixed in this manner, great care must be taken to keep them clean;—if the ligatures are allowed to get foul, the teeth are apt to become corroded by them.

There is another form of this affection, in which the gums and bony sockets of the teeth become gradually absorbed, and shrink away, so as to lay bare the roots of the teeth; but still the part which remains imbedded in the jaw, continues firmly attached, and it is not until the disease has reached its last stage, and the teeth hang only by the tips of their roots, that much inconvenience is experienced. This complaint is not quite so common as the one last treated of, but it appears to result from similar causes, in fact, the two forms of disease are not unfrequently found co-existing in the same mouth, and more or less blended together. Although it occasions less pain and inconvenience than the former one, it is even less under the control of remedies;—we may generally check and retard its progress to a certain extent, but can seldom succeed in stopping it altogether,—and, of course, the loss of substance that has actually taken place, can never be restored. Doubtless much more might be done in the way of remedying these affections, if those who suffered from them had patience and resolution enough to persevere in the treatment; but as this generally has to be continued for a considerable time,—and constant care and attention is requisite to prevent a recurrence of

the disorder, many persons think that the remedy is worse than the disease, and would rather lose their teeth than take so much trouble, and deprive themselves of certain luxuries in the way of eating and drinking, &c., in order to preserve them.

I have two or three times had occasion to allude to the accumulation in the mouth of the substance called "TARTAR;"—this consists chiefly of various earthy matters deposited from the saliva,—and, in certain unhealthy conditions of the mouth, or of the system generally, it collects round the teeth in large quantities;—but there are few individuals who are not subject to it more or less. I have mentioned one of the evils arising from its presence, namely, decay of the teeth; it also keeps the gums in a continual state of irritation and tenderness, causes them to recede from the teeth, and by insinuating itself deeper and deeper along the roots of the teeth, destroys their connection with the jaw, and causes them to get loose and fall out. Being porous, it serves also as a reservoir for all sorts of fluids, such as the juices of the food, secretions from the gums, &c.—which are continually undergoing putrefaction, and thus it renders the breath offensive, and occasions a foul, unpleasant taste in the mouth; where it is visible, it is equally disgusting to the eye;—for all these reasons, it is incumbent on all who value their own comfort, and have any consideration for the feelings of others, to spare no pains to keep their teeth free from this filthy incrustation. Where the teeth have been from childhood regularly and properly cleaned, inside and out, the tartar is prevented from ever accumulating, but when it has accumulated in consequence of neglect, the ordinary mode of cleaning with a brush will not remove the evil;—the operation of SCALING must then be performed,—and when the teeth have been scraped or *scaled* quite free from the tartar, they may then be kept clean for the future, by the use of the brush and appropriate tooth-powder. I believe some persons object to the operation of scaling, in consequence of some very curious fancies,—such as that it is very painful,—that it injures the enamel of the teeth, causes them to decay, makes them loose, &c.; it is difficult to imagine how such erroneous ideas could

have arisen; the operation is attended with little or no pain, and inflicts not the smallest injury on the teeth, but, on the contrary, preserves them from decay and destruction; I have already made some remarks on this subject as far as relates to *decay*; with respect to the loosening the teeth, this is produced by the *presence* of the tartar, not by its *removal*, which prevents the further progress of the mischief, and allows the gums a chance of returning to a firmer and more healthy condition. I have known some individuals excuse themselves from even the use of the tooth-brush, on the pretext that it injures the teeth to clean them; this opinion has perhaps arisen in consequence of some injurious substance being employed for that purpose, as I shall presently explain; the cleaning of the teeth, when done in a proper manner, is one of the most effectual means of preserving them. All persons ought to clean their teeth, at least once a day, some require to do so oftener, even after every meal, as well as on rising in the morning: in some few individuals, the mouth is in such a healthy state, that water alone is sufficient for the purpose, but most people require the aid of tooth-powder; this must be suited to the nature of each case—that which would be perfectly effectual in some cases, would be of little or no avail in others; and now that I am speaking of tooth-powder, I may as well caution the public against the indiscriminate and excessive use of certain substances which are much employed for this purpose. Camphor is a very favorite ingredient in tooth-powders, and it is very fragrant and refreshing, but I have known it in many cases give rise to very serious mischief, the teeth becoming deeply notched on their external surface, close to the gum, just as though they had been cut away with a three cornered file; sometimes there is not much loss of substance, but the teeth become very tender and sensitive to heat and cold, and at length decay away close to the gum. Charcoal also, which is another substance much used as tooth-powder, is apt to cut the teeth in the same way.

With regard to the various "Odontos" and "Dentifrices" which are puffed and advertised into notoriety, and which are

retailed by parties who are utterly ignorant of their nature and composition, but who nevertheless take all the pains in their power to recommend them to the public, I can only say, that without knowing precisely what they consist of, no positive opinion could be given as to whether they were likely to be beneficial, harmless or injurious; but I would caution persons against the use of those dentifrices which profess to "*whiten*" the teeth; if they have this effect, they most probably contain some ingredient of an acid nature, which although it would have the effect of "*whitening*" the teeth at first, would render them more liable to become discolored afterwards, and which by habitual use would completely destroy them. The surface of the teeth should be kept as *clean* as possible, but no attempt should be made to alter the color of the teeth themselves; if the discoloration is produced merely by tartar, or other matters deposited on their *surface*, it may and *ought* to be remedied by the removal of the tartar, &c., by mechanical means; but when the *substance* of the teeth is discolored, any endeavor to "whiten" them by acids or other chemical agents, will be not only useless but mischievous. Besides scouring the surface of the teeth from all extraneous matters, the dentifrice should have the effect of checking the formation of the tartar, rendering the gums firm and sound, and keeping the secretions of the mouth in a healthy state. Some persons prefer a dentifrice prepared in the form of a *paste*, but I think that, on the whole, the form of a *powder* is most effectual and convenient. As to what is *the best kind of tooth-powder*, this, as I mentioned before, will depend on the nature and circumstances of each case; there is no one kind that would suit all persons indiscriminately, and people would do well to bear this in mind, and not go and buy tooth-powder in the same way that they would buy a box of plate powder, or a jar of blacking.

I do not intend now to enter minutely into the subject of ARTIFICIAL TEETH; I will merely remark with respect to them, that notwithstanding they have been brought to such a degree of perfection, as to serve almost all the purposes of those with which nature has provided us, yet the process of mastication is always

somewhat better performed with good, sound teeth of our own, than with the best artificial substitutes: moreover, artificial teeth cannot be supplied equally well and successfully in all cases; it will be prudent, therefore, to take all the means in our power to preserve our own teeth in good condition, and not, as I have known to be the case with some persons, be careless about the preservation of these useful and important organs, in the expectation of finding no difficulty in supplying their loss with artificial ones; such over confidence in the resources of the dental art, should be avoided; but, at the same time, we should bear in mind, that well constructed teeth will enable us to masticate our food very much better than we can do when our own are loose, imperfect, or deficient. I may as well mention, that one serious objection which formerly existed to the use of artificial teeth, namely, the disagreeable idea of wearing teeth which had been taken from the mouths of dead persons, is now completely removed by the introduction of porcelain or *mineral* teeth, which are manufactured of great beauty, and in close imitation of nature; these have also the advantages of superior cleanliness and durability, as they never corrode or decay in the smallest degree. The improvements that have been made in the art of mechanical dentistry during the last twenty or thirty years are very great; and as the progress of improvement tends also to facilitate labor and diminish expense, the resources of the dental art are brought more and more within the reach of the public, and the number of those who avail themselves of artificial teeth is continually on the increase.

I should have liked to make a few observations on various other matters connected with the teeth, especially the serious injury to the general health, which frequently arises from a diseased state of the mouth; entailing on the patient much suffering and distress, in addition to the more immediate effects of the local disorder, such as tooth-ache, swelled face, tic douloureux, &c.—but I have already extended my remarks over a larger space than I at first intended, and I trust I have said sufficient to induce people in general to pay more attention to their teeth, and no longer neglect those means which are requisite for

their preservation. Timely care and attention are to be recommended even on the score of *economy;* many persons after they have lost their teeth through neglect, find themselves obliged to procure artificial ones at a much greater expense than the preservation of their own would have occasioned them; and those who are suffering from tooth-ache would gladly pay double as much to get it *cured*, as they would have had to pay for its prevention. It may be objected that there are numbers of persons who, although they are fully aware of the evil consequences arising from neglect of the teeth, and would gladly avail themselves of the assistance of the dentist in good time, are prevented from doing so by a fear of being unable to afford the necessary expense. I believe much misapprehension prevails on this point; the operations of dentistry are in general not so costly as many persons are apt to imagine; the earlier the mischief is attended to, the less will be the expense; and many persons actually pay more for the extraction of their teeth, and for nostrums to cure the tooth-ache, than they would have had to pay for the preservation of their teeth, and the prevention of tooth-ache altogether. However, granting that the operations of dental surgery are somewhat expensive, a considerable reduction would always be made in favor of the working classes, as in the case of medical and surgical attendance generally; moreover, I see no reason why dispensaries for diseases of the teeth should not be established, not exactly as *charities*, but rather as *clubs*, "self-supporting" dispensaries as they are called, where people, by the annual payment of a few shillings, could have their teeth kept in order, and all the requisite operations performed for their preservation; we have hospitals, infirmaries, and dispensaries, for all other diseases except those of the teeth and gums, and it is high time that this deficiency was remedied. I am confident that institutions of this sort will be established at some future time, and then every body will wonder how it was they were not set on foot sooner. Up to a recent period the assistance of the dental surgeon has been regarded in the light of a *luxury*, to be indulged in only by the wealthy and higher classes; this opinion is now, by the march of civilization and

improvement, fast disappearing, and before the lapse of many years, will, I trust, have almost ceased to exist among us. It will, doubtless, be the same with this as with the other arts of life; that which to our forefathers was a rare and costly luxury, will, to our posterity, be an ordinary and almost necessary comfort, enjoyed by every, or nearly every, class in society.

I shall be rejoiced if I am able in any way to contribute towards hastening this diffusion of the benefits of science, as regards this branch of the healing art, and thus be instrumental in bringing about a much more widely spread prevention or alleviation of some of the numerous sufferings to which mankind is subject.

Bridgwater, January, 1851.

ARTICLE IV.

Report of Discussions and Proceedings of the Mississippi Valley Association of Dental Surgeons. By ALLEN LESLIE.

WE had the pleasure of attending the seventh annual meeting of this Association, held at Louisville, the 11th, 12th and 13th of September last. This, in some respects, was an interesting convocation, and to some, doubtless, may prove a profitable one. We regret the necessity that prevented our presence during the first day's proceedings, and prevented our hearing the address of the president, Dr. Griffith. But we understood it evinced his usual clearness and comprehension.

During the first day's setting, an invitation was extended to the profession in Louisville, to participate in the discussions of the subjects which might come before the Society. Drs. Davis, Dudley and Kirkpatrick being present, embraced the opportunity thus afforded. During the same day's session, Dr. Goddard, in consideration of the high professional standing and moral

worth of Dr. Somerby, moved that he be declared an honorary member of the Society. This the Society unanimously agreed to.

In the interim between the morning and afternoon session, the Society, by invitation, dined with the president. The evening session was spent at the office of Dr. Goddard, in the discussion of the queries presented to the Society, by Dr. Drake, five years ago, and from time to time referred to committees. No report ever having been obtained. Of this discussion I can say nothing, not being present, further than that I understood Dr. James Taylor took notes of it that he might make a report in the Register.

Thursday Morning, 9 *o'clock.*

Society met again at Temperance Hall.

During this session, were present, Drs. Griffith, Goddard, Baxter, Ulrey, Hunt, Allen, James Taylor, McCallom, Leslie, Dudley, Davis and Kirkpatrick.

Dr. Ulrey being called upon, read a short paper on the subject of atmospheric pressure plates.

On this, Dr. James Taylor remarked. That he had been depending more upon this principle, for sustaining plates within the last year, than formerly, and believed his practice during that time, in this particular, had been more successful. He did not confine himself to any particular form of chamber, but varied it according to circumstances. He had made chambers by enlarging the ruga. Had formed the Flagg chamber, and, indeed, had tried all proposed forms. He, however, preferred the chamber in the center of the arch. He usually made the one he prefers, by placing some wax on that portion of the plaster model, and trimming it to about the thickness of a dime, leaving its edge acute. In this way he was able to strike up a chamber at the same time he struck up his plate, and no soldering was required about it. He has during the past year been using plaster, as the substance to take his impressions, and thought his better success during that time was owing to that fact. And he would recommend it to the Society as a thing altogether superior to wax, for impressions. He knew it was more difficult to use at first, but if gentlemen would stick

to its use in full upper sets, in a short time they would not abandon it. He had made out to take some under impressions with it, but here, and in partial sets, he generally uses wax. In using plaster he places a rim of wax across the back of the holder. In the center of the impression before its removal, and after it has set, he inserts a probe, which allows the air to pass into the arch. Then immediately the impression may be removed. He did not think salt necessary in using plaster to make it set quick.

Dr. Allen. Preferred wax as a substance to take impressions. He had tried all the various chambers. He had found those on the ridge very serviceable. He had constructed some under the front teeth, that worked well. He thought an advantage arising from the use of chambers on the ridge, to be the overcoming of some of the evil results of soft spongy gums. He preferred to form the plate by striking up the chamber and plate in one piece as followed by Dr. Taylor. He usually made the plate as large as possible, believing that the larger it was the better it would hold. But he held that much depended upon the articulations of the teeth, whether or not the work would be serviceable. Many failed by setting the teeth too far outside the ridge. He had frequently to correct the work of his young men in this particular, and he thought it a point too much overlooked generally. The Dr. seemed to consider a chamber an essential part of atmospheric plates.

Dr. Goddard's views being called for, he said, he did not know any thing about it. He thought it a mistake to make plates as wide as we had been in the habit of making them the last few years. He had found that wide plates, after being worn for some time, would be found bearing hard upon the center of the arch, creating thereby a rocking motion of the plate, the result as he conceived from the wasting of the ridge. He is now using the old fashioned moderate sized plate, which does not cover all the hard palate. He also prefers wax as a substance for the impression.

Dr. Taylor. Had also found the rocking motion from undue pressure on the arch. He had tried to obviate the difficulty by

adding some wax at that part of the plaster model before making the plate, but it did not overcome the difficulty. He, therefore, inclined to the opinion, that plates were frequently made too wide, and that we had better make them in some cases, as Dr. Goddard suggested.

He agreed with Dr. Allen, in the principle stated, that pressure is generally according to the surface, but he thought the plate should not extend further behind the chamber, than sufficient to give a bearing to the edge of the chamber and prevent its being forced into the gum.

In answer to the request of Dr. Leslie, that he would explain on scientific principles, the mode upon which the partial vacuum in the chamber is obtained. The Dr. said, he did not know that he could give a full explanation of the thing. About all we know is, that some how or other, it was done by the wearer applying the tongue and sucking out a portion of the air. In answer to another query, the Dr. said, he used the plaster about the thickness of cream. Dr. Leslie further asked, how, in that case, he got the impression of a mouth with a high arch. Dr. Taylor said, there was always a portion of plaster in the bottom of the cup a little thicker. This he removed, and with a spatula placed it in the elevated portion of the arch; he then inserted his holder containing the balance.

As an instance in proof that a narrow plate would some times be preferable, he stated that he had lately been called upon by a lady having a temporary upper set which was not a good fit. She wished a set inserted on the pressure principle. He took an impression, and the first trial obtained a plate requiring some ten or twelve pounds weight to dislodge it by a direct pull. He attached the teeth and inserted it to his own satisfaction, but practically they did not suit the lady. If she attempted to bite with the front teeth, the back part of the plate would drop. Still she could use the old set in this way without that effect, although a little direct force would dislodge them. He made a second and a third set, but without making them preferable to the old one. He then concluded to make a plate just like the old one, which was narrow. He did so, and they proved more satisfactory.

Dr. Leslie remarked, that to him this was an interesting subject, for he had never been able to agree with the majority in the views they held. This is a matter which has occupied the attention of the profession through our periodicals and otherwise, quite largely and for a length of time, and he had watched the devolopment closely. Conscious that his views differed, he has endeavored to sift the views of others on this subject, in order that the searching might if possible clear up any mistakes he himself may have made. This it was also that pointed the queries addressed to Dr. Taylor.

I have, Mr. President, always been a questioner of the advantages of cavity plates. Hence, whenever I have met with gentlemen who claimed experience in the use of them, I have put such questions as I did to him. I claim not to have had much practical experience in the use of the cavity, simply because I have never been able to convince myself of their advantage, or to have been so fortunate as to be so enlightened by others; hence my course. And if I am pointed in my remarks, it is simply that I may convince or be convinced of error.

My own view of the matter is, that cavities in atmospheric plates will ultimately be abandoned. I found this opinion on the fact, that with but one exception the arrangements of this nature are unscientific in their construction, and that a vacuum cannot be formed in any of them, unless they possess the valve of Dr. Dwinelle. They then become the exception which may be considered scientific in its construction. I have asked Dr. Taylor, as I have others, to explain how even a partial vacuum can be formed in the cavities he and they make use of. And I have found that when the difficulty of explanation was not immediately perceived it was at least felt, and the most I have obtained was, that they judged by the *effects* the cavity produced in some cases upon the gum, that a portion of the air was exhausted; secondly, that such plates adhere more firmly than those without the cavity. And they consequently conclude the air was got out by "suction." Now, sir, I think that gentlemen allow themselves to be led astray by *appearances*. I conceive it to be no proof that there has been a par-

tial vacuum in a cavity, because you find on removal of such a plate that the gum over such cavity is swollen. This *may* be the result in a mouth where the gum is in any way spongy if having a cavity there.

That portion presented to the cavity is not subjected to the pressure the portion is which the surrounding plate lies in close contact with, it is, therefore, left free to develop fully its spongy tendency by protruding into the cavity. And this tendency, be it noticed, is increaced by the *surrounding* pressure. So that you see, sir, I must take part of their evidence, and claim it as another proof that the cavity plate must be abandoned.

I hold further, that cavity plates must be abandoned, even were I wrong in assigning the swelling of the gum into such cavities to the absence of pressure there; because, I hold that if there is a vacuum, be its degree what it may, the tendency must inevitably always be for the gum to fill up the cavity. And I feel assured, by analogy, that where the means exist of forming a vacuum in such cavities, the gum would ultimately fill them up, unless such means of preventing it are adopted in Cleaveland's chamber, which may be viewed as a chamber beyond the ordinary chamber, having very small openings into the second, which arrangement, the patentee himself says, is to prevent the gum swelling so as to fill up the second chamber. This clearly proves one of my positions, that *if* a vacuum is obtained in ordinary cavities it will in time be filled up by the gum.

If we examine the actions of an air pump exhausting the air from a vessel on the lecturer's table, we perceive he attaches the pump to a truly turned metallic plate, in the center of which we observe a small opening which communicates with the pump chamber. We understand at once the object of it; it is for the egress of the air. If the edge of the glass vessel is not perfectly true so as to form a *perfect* joint with the plate, he uses a rim of buckskin to effect this, so essential is it that the edges of *his* cavity should fit close *all round* when he *commences* exhausting their chamber. Not so, the dentist who uses the cavity, he tilts the vessel (cavity) to one side and

"sucks" the air out. We have another illustration of the partial or complete exhausting of a chamber in the act of cupping. These cups, in which the air pump is used to exhaust the air. These have a valve on the top, and we see at once how the air may be exhausted, it is done precisely on the principle of Dr. Dwinelle's chamber. We have also the old fashioned cup, in which a flame is inserted for the expulsion of a portion of the air. Here again we see the mode; not so in the cavity practice, and until we are shown a better explanation than has yet been given, we must hold that they have not any more pressure by means of the cavity than can be got without, and I question if they have as much as exists in a well formed plain plate.

A question, which I think of some importance to determine, as nearly as we can, is, what *amount* of atmospheric pressure is requisite on an upper set of teeth, in order that they be useful. Some men there are who promise their patients from five to twenty pounds, as it may be desired, or as they think the case demands. To hear them talk, one would think it was as easy to do this as to make the chamber. But for my part, I never say any thing of pounds to my patients, all I promise is a useful set of teeth; this is all that is needed. It may not be startling enough for a striking advertisment, but as I never aim at such things, it matters not to me. I trust always to redeem my pledge, by using the plain plate; and here let me say, that it must, I think, be within the power of all dentists of experience to refer to sets of teeth they have inserted with the plate, void of any cavity, which gave entire satisfaction to the wearer, without the aid of springs. And I believe it may be said of such cases, that they are preferred by the wearer as well as the operator to those with cavities.

The amount of pressure on a well filled and properly articulated set of upper teeth, need, I think, but little exceed the actual weight of the operation, and the pressure exerted by the tongue in articulation. Where the plate is properly adapted, and there is any thing of an arch in the mouth, and the plate can be brought over the ridge, mastication but increases that

pressure on the exposed surface of the plate. Of such a plate, of course it is a prerequisite that it should stand pressure in any part, without dropping at the opposite point.

We all know that some plates we make take hold, so to speak, of the gum better than others. This irregularity is attributed by some to various causes, peculiar form of the mouth, sponginess of the gum, &c. &c. When I meet with a plate that does not stay up, I lay it to myself, not to the mouth, to a failure in my impression, and set about taking another. I do just the same when it rocks on the center of the arch, I view it as my fault. I may have failed in gaining the impression from pressure against the lips in removal. I think more harm results from these soft parts, than from those on the ridge, which some gentlemen fear so much. Having obtained a good impression, I consider there is no difficulty in making a plate which will be retained by atmospheric pressure.

This atmospheric pressure I conceive to be obtained by an approach to a perfect *adaptation of the plate to the mouth.* The more perfect this is, the greater the pressure. Such a plate, when placed in the mouth and forced against the gum, displaces the air that is in contact with that surface. And *thus* the balance of pressure is created upon the exposed surface of the plate, and this it is, which retains it in place. Hence, simple occlusion of the jaw is *sufficient* to restore the pressure when the plate inclines to drop.

This, I conceive to be the true theory of atmospheric pressure, as applied in dentistry. Consequently, I cover as much surface as possible, when I want this pressure. This is in accordance with the well known principle alluded to by Dr. Allen, that the pressure is according to the extent of surface.

It is in accordance with this theory, which I have endeavored to develop, that I conceive the artificial enlargement of the ruga, and all forms of chambers not possessing the valve of Dwinelle, as worse than useless, from said cavities being reservoirs of air, by which the plate is sooner separated from the surface of the gum. And as a matter of course, if the air is not partially exhausted from the chamber, there is not as much pressure on the plate as if it was not there.

I object, then, to the use of chambers. First, because they are not what they are supposed to be, partial vacuums. Second, that if they were, they would to that extent produce swelling of the gum into the cavity. Thirdly, because they are unnecessary, the simple plate being sufficient. I throw these thoughts out, observing, that if there be error in them, it will be shown by those who perceive it.

Next, sir, a word or two on the impression. It is claimed by those who prefer prepared gypsum as a medium to receive an impression, that its chief advantage consists in the perfection with which they obtain an impression of the soft ruga and spongy ridges, without any displacement of the soft parts, there being no pressure required in its use. While in the use of wax, these parts are more or less displaced.

Of plaster, I would say, that if it were possible to use it under circumstances requisite to its most perfect application, that *it* would undoubtedly be preferable. But I have yet to learn how it may be so managed. To obtain with it a *perfect* impression, it should be used as thin as the medalion maker employs it. This is much thinner than Dr. Taylor employs it. You will now, sir, perceive the force of my inquiry of the doctor as to how he obtained an impression of the elevated arch.

Here he finds it necessary to use, shall I say, a piece, it would be near, if not quite the truth. At least, it must be considerably thicker than cream. I had thought, sir, and still do not see otherwise, that plaster should be used just as it begins to set. Because, if used in the liquid state, it must follow the law of liquids, viz. seek a level. Now, sir, I question whether in either of these states, a more perfect impression can be obtained with it than with wax. Again, sir, is it a fact that it can and is used without any pressure. If so, a steady hand must sustain the holder, an equally steady one the patient's head, as the *least* motion during the setting of the plaster, *must* change the impression. I will, sir, frankly acknowledge, that with wax it may be impossible to get an *absolutely perfect* impression. But, sir, I think that with proper care, your success will be quite as great with wax as with plaster as *now*

used, and while the advantage is clearly in favor of the plaster, the simplicity of wax must give it the preference. I make use of pure yellow wax, softened in water, not above 140° F. It should never be allowed to melt in the surface. It is also best to use it but once, it is then tougher, not to mention cleanliness.

Another thought which has been presented, of which I could not see the philosophy. It has been asserted here, and I have heard of it elsewhere, that if you insert a probe through the plaster or wax, until it touch the elevated portion of the arch, you could immediately remove an impression, which, without such a course, would have been destroyed by the force necessary to remove it at the same period. I say, sir, I cannot understand the working of the probe. It may be ignorance, but it appears to me, that if I was to fill a vessel with wax or plaster, and turn it bottom up, and insert a probe such as the gentlemen uses, it would only allow air to pass to the surface the probe touched.

By what means the air is to pass between the vessel and the wax, or between the gum and wax or plaster, radiating from the small opening, I cannot so clearly see, especially as its effects are said to be immediate. If it were claimed to be a slow process, I would admit it may be of some utility. Or if the plaster or wax had not been placed in close contact with the highest portion of the arch, I could see how the external opening would operate upon the confined air in that cavity, but in the way claimed I cannot. I could see how, if it were such a fluid as water that filled the supposed cup or arch of the mouth, that the insertion of a tube which would pass air to the upper surface would radiate *immediately* over said surface, because in this case, the fluid would immediately descend, not so in the other. In my own practice, consequently, I make no use of the probe. Not because my impressions do not adhere as firmly as those of others, but because I conceive the mode I adopt, of overcoming the difficulty, as superior. My mode of procedure is based upon what I believe to be a fact, viz. that the soft parts (buccinator muscle and mucous membrane) act the part in the impression that the rim of buckskin does under the air vessel. It makes the adaptation more perfect.

My first step in accordance with this view, after the wax has set is to raise these soft parts, first on one side and then the other, repeatedly if necessary, allowing the air in this way to gain access to the whole rim of the impression. The result I find to be that an impression which before would have been destroyed in the attempt to remove it, now may be removed safely. I can feel it give way. In the language of others, "it will presently drop."

Dr. Griffith said, he had been in the habit of using the probe and found it very serviceable.

Dr. Taylor admitted, that the soft parts named by Dr. Leslie, played an important part in the adhesion of the impression, and he always raised these also, so Dr. L. had described. Still he contended, that the probe was indispensable, and that the air did pass from the opening it made, over the surface of the arch.

He was certain his views respecting the great advantage plaster had over wax, would be found to be sustained, if gentlemen would try it more. One thing he would say for it, and that much he could not say for wax. He would undertake to get a plate that would stick to the mouth, from the first impression. If he could not do this with any mouth, he would forfeit fifty dollars. He, however, believed the day was approaching when cavities would be abandoned, and the simple plate be proved sufficient for our purpose, for he must say that he had inserted many sets without the chamber, and that on the whole, he and his patients preferred such, when he could get them, to those with the chamber.

The address of Dr. Baxter, on the use of palladium, being next in order, at his request, further time was granted him, and he was appointed one of the essayists for next year.

Drs. Davis and Kirkpatrick were, on presentation, by the examing committee, elected members of the society.

Dr. John Allen, who was appointed at the fifth annual meeting to prepare an address on the subject of artificial gums, was next called upon. The Dr. arose, and stated that he had not prepared an address on the subject, and if he presented any thing it would have to be extempore. The Dr. informed

the society that he had been experimenting a number of years, endeavoing to perfect this thing. He had been at great expense before he had arrived at the state of perfection he had now reached, and he felt convinced he had now got all that need be desired in this way. He had discovered a method by means of which single teeth could be surrounded by a silicious substance, which would stick to them and to the plate firmly.

The Dr. held that his improvement would entirely change the whole practice of mechanical dentistry. The advantages he conceived to be, great expedition, great strength, perfect cleanliness ; as it is impossible, he says, for even moisture to get between the plate and this silicious cement. It is also susceptible of greater beauty of finish. It is also of especial superiority, when atmospheric pressure is desired, as the plate undergoes no change whatever in the fire. He has also tested the matter practically in the mouth, and was fully satisfied of its usefulness. These were the main points claimed by Dr. Allen, for what he claimed as his invention.

Dr. Allen presented several pretty specimens, and eulogized his improvement very effectually. This was the amount of his address, and all we are constrained to say, which appeared to be his object, for when he had taken his seat we knew nothing more about the subject than when he arose. We had heard no new principle elucidated, no new fact explained, none of his materials even *named*. He also informed us that one of the most essential parts of the discovery consisted in a means of retaining the teeth in place, during the fusion of the cement. This he claimed to have discovered, but did not make known.

We should not say less than that we considered it trifling with the time of the Society, for the Dr. to come before it thus. But so thought not all of the Association, as immediately the following preamble and resolution was offered by Dr. Goddard :

Whereas, Dr. J. Allen of Cincinnati, has been for several years engaged in prosecuting a series of experiments, of which we have been cognizant, for the purpose of acquiring principles by means of which an artificial gum could be formed upon mineral teeth, and metallic plates, in such a manner as to unite

them firmly to each other, and thereby render more perfect the present method of setting artificial teeth on plate. And whereas, the results of his experiments have been highly satisfactory to the members of this Association, as exemplified in the specimens he has exhibited. And believing it due to any member of our society, who devotes his time, money and talents to the advancment of any particular branch of the profession, so that benefit may result therefrom, that some action or commendation is necessary.

Therefore, in view of the great benefit which must result to the profession, and the public generally, from the indefatigable exertions of our brother, Dr. J. Allen, in producing a mineral substance, by the use of which artificial teeth may be more perfectly placed in the mouth, and made to resemble the natural organs of mastication.

Resolved, That this society award to him a gold medal.

This being seconded by Dr. James Taylor, the president undertook immediately to take the vote. But one of the members desiring to discuss the matter, it was, on his motion, laid on the table until the afternoon session.

The society then adjourned.

Afternoon Session.

The President announced the first business to be the consideration of the motion laid on the table before adjournment.

Dr. Taylor desired now to withdraw his second, and offer another resolution as a substitute.

After some discussion on the points of order involved, further action was, on the suggestion of Dr. Leslie, waived, until the mover, Dr. Goddard, should be present.

A short time was now allowed in hearing some remarks of Dr. Davis, on the use of palladium, as a base for teeth. The doctor claimed for it a preference over gold, as regards oxydation. Also greater strength, and consequently less weight in a given piece of work, than if made of gold, and a saving in cost. He claimed for Dr. Childs and himself the credit of having introduced it into practice. This they done in Philadelphia.

But as the doctor intends preparing a paper for publication on the subject, fully explaining his practice and experience in the matter, we defer further remarks.

The consideration of the preamble and resolution of Dr. Goddard, was now resumed, he being present, when, on motion of Dr. Taylor, they were referred to a committee of three, to report in the evening. The chair appointed Drs. Taylor, Goddard and Leslie, said committee.

Dr. Goddard presented the name of Dr. Somerby, as a candidate for active membership in this society. A ballot having been had, he was declared unanimously elected.

Adjourned to meet at the office of Dr. Somerby, at 7, P. M.

Evening Session.

Committee of three called upon to report.

Dr. Goddard asked for the committee further time. It was allowed until the morning to prepare its report.

The evening session was mainly spent in discussing the treatment of teeth in plugging, after the exposure of the nerve.

Dr. Allen related what he could call to mind, of the discussions just held in the American Society on this point, and stated the aphorism adopted on this subject. He preferred to cut out the nerve at once. He uses a small piece of hickory wood; but his own experience in the practice, was not as encouraging as that of many members of that society.

Dr. Griffith called the attention of the society to his mode of treatment, which he had spoken of a year ago. When he exposed the lining membrane of a tooth, he wiped the cavity out carefully, and placed next the membrane a small portion of cotton, partially saturated with kreosote; over this he plugged, and he experienced no difficulty afterwards. He had removed many fillings of this kind, and had found that the kreosote was absorbed, and he considered that it had excited a degree of inflammation which resulted in the formation of a new layer of bone, as a protection to the pulp and membrane.

Dr. Goddard had no experience in plugging over nerves, he preferred excision. Had plugged many teeth in the latter

mode, and had found it to work well, and believed the remaining portion of the nerve took on a healthy action, and in many instances deposited a protecting layer of bone.

Dr. Somerby had always viewed this from a physiological point of view. He had early been grounded in correct pathological and physiological principles and anatomical facts, and he objected to this plugging of dead teeth, because it could not be done unless some of the laws of physiology were outraged. He could not see how arsenious acid could be so used as to destroy the nerve just to the point of exit from the fang, and there stop. He could not so nicely arrange it, as some gentlemen appeared they could.

He thought if its influence reached the point, it would be felt beyond it, and produce disease, ultimating in the extraction of the tooth. The doctor believed that more injury had been done by the announcement that teeth could be saved after the exposure of the nerve, than had resulted from the use of amalgam. His experience in the extraction of teeth, which had been treated in this way, was quite extensive; he, perhaps, saw more cases of failures, than those did who operated thus, and he thought we ought to be careful that in adopting this practice, we should base it upon extensive experience. In illustration of what *may* result in constitutional derangements, from the presence of a small amount of decomposing or poisonous matter, at the point of a fang of a tooth, the doctor referred to the poison of the rattlesnake, the virus of the cow pock, the wound in dissecting, and the sting of a bee. He had also found in this kind of operation, the most inferior plugger was more apt to avoid immediate trouble, than the most finished workman, because his mushy fillings allowed gaseous, or more solid fluids to escape through them, while the solid fillings make them seek egress through the fang.

The society, before adjournment, went into an election for officers. Dr. Somerby was elected President, and James Taylor, Editor of the Register.

By report of the editor, it was found the cost of the publication was some fifty dollars in excess of his receipts; an order

on the treasurer was drawn for the amount. Dr. Taylor informed members of the society, that he would, during the coming year, conduct it at his own expense, and with this understanding, it was continued under his editorship.

Adjourned.

Friday, 8, A. M.

Committee on preamble and resolution being called upon for a report, presented the following majority report:

"The committee to whom was referred the preamble and resolution of Dr. Goddard, in relation to Dr. Allen's improvement in the method of attaching teeth to plates, submit the following report:

"That they have examined the teeth cemented to the plate, by Dr. Allen, and have subjected them to the following tests: they have tried their strength of adhesion, and believe that no ordinary force, such as is used in masticating food, &c., will loosen them from the plate; indeed, so far as they can judge, the adhesion to the plate is much the same as that effected by the use of solder, hence, the entire base of the teeth being secured by the cement, there is greater solidity, and no room for the lodgment of particles of food about the teeth, thus forming a substitute for block work, possessing all the advantages of block work, with more strength and security to the plate.

"They have subjected the gum to the action of nitric and sulphuric acids, and after the pieces had lain over night in these acids, they found no appreciable effect made upon them, although the acids were in a concentrated form. The committee are satisfied that this mode of securing the teeth to the plate, recommended by Dr. Allen, possesses cleanliness and strength, and so far as we can judge, durability.

"The committee would remark, that in using this cement, the plate used by Dr. Allen is platinum and pure gold, alloyed with 4-100 of platinum, and this greater purity of metal, which more effectually resists the action of the secretions of the mouth, they regard as advantageous, because it secures the public against the use of impure gold in mechanical dentistry. In view of the labor and expense to which we are satisfied

Dr. Allen has been subjected, in bringing this improvement to its present state of perfection, and the advantage to the profession which its adoption we think will insure, we therefore recommend the following resolution :

Be it Resolved, That Dr. Allen deserves all commendation for his indefatigable exertions in thus developing, and making available, a new and important improvement in mechanical dentistry, and that we recommend this improvement to the profession, as worthy of their attention.

JAMES TAYLOR,
W. H. GODDARD,
Majority of Committee.

On motion, this report was accepted. When Dr. Leslie presented the following minority report:

Report of a minority of the committee to whom was referred the preamble and resolution of Dr. Goddard.

Your committee would report, that it has ascertained from Dr. Allen, that it is his intention to procure, if possible, a patent for said mode of work, and that he has filed his caveat in the patent office for the same. This your committee would deem sufficient reason to advise the society not to grant any award of merit in the case, inasmuch as he looks for a reward in the sale of patent rights. Your committee still further feel constrained to object to the award, because the principles which led to the formation of this and kindred societies are inevitably subverted, when the right is recognized in any of its members to patent their improvements in practice.

It is also to be objected to, because it is contrary to the expressed will of the society, as shown by several resolutions to be found in its published minutes, as well as the public teachings of some of its prominent members. It is also not only not sustained by the most enlightened dentists every where, but is by them most decidedly disapproved.

Farther, your committee have had no proof of the practical usefulness of this mode, no cases having been brought before it which had been subjected for any length of time to the friction of mastication, and your committee would suggest that one

year, at least, is requisite to test the mode in this respect; and that until that time expires, no resolution approving it should be passed by this society.

Again, your committee have had no insight into the matter afforded them by Dr. Allen. He has come before it, as he has before the society, with the matter as a secret. No queries are answered, no light is given, which was not already in the possession of all or a part of the committee.

In view of the foregoing facts, your committee recommend that you do not accede to the proposed award of a gold medal. And further, your committee recommend the adoption of the following resolution:

Resolved, That it is now, and always has been, the sentiment of this society, that it is derogatory to the professional character of any of its members to patent any instrument or improved mode of practice. And, inasmuch, as the forbearance of this society has heretofore been misunderstood, we do now declare, that for any member of this society to patent any instrument or improved mode of practice shall be deemed sufficient cause for expulsion.

Respectfully submitted,

A. M. LESLIE,
Minority of Committee.

Dr. Leslie moved the acceptance of this report, and Dr. Goddard responded with a second.

Dr. Leslie opened discussion upon it, by saying, that he would substantiate that report by a reference to documents no one could gainsay. He did not wish the society to suppose he had spent much time in the preparation of the report, as the probable necessity for it had only become apparent a short time previous to this morning's meeting. Further, he would say that he would present but a small portion of such documentary support as might be produced in proof of the correctness of the report, had more time been afforded for the same.

First, this report advised that you refuse the gold medal, because the claimant of the improvement intends patenting the same if he can, this he acknowledges. I will now endeavor to

show you, from your own acts, that this society can give no countenance to the proposition awarding a gold medal for any patent improvement. That this is no new proposition here, I call your attention to the published minutes of the first annual session of this society. On page 12, we find the following, presented by Dr. Challen:

"*Resolved*, That the discoveries and improvements known to the members of the dental profession, are, and ought to be, considered as the common property of the profession."

Here, then, we see that this was one of the first subjects which the association thought necessary to come before it, and it thus early threw its influence against patents. But I propose still further to show, that even this position was deemed not decided enough for this association to hold in this matter. For they had found that even in the face of this expression, one of its officers, viz. Dr. John Allen, of Cincinnati, here presented what he conceived to be a very important improvement. And I will venture to say, that the respected mover of the resolution I will now read, designed to apply it, if adopted, to the very case I have mentioned. I will read now from the minutes of the second annual meeting, page 7:

"The following resolution was offered by Dr. Edward Taylor:

"*Resolved*, That any member of this society, who may patent any instrument or improved mode of practice, may be subject to expulsion from the society."

In discussing this it was "especially contended by Dr. James Taylor, that while a piece of mechanism applied to the arts, and which can be made and sold, wholesale and retail, so that all who wish may buy and use, and the inventor receive his reward without injury to the public—might, with propriety, be patented; yet, a principle of that science which claims for its object the amelioration of the ills of life, which seeks, on all occasions, to be known for its usefulness, which we as a society have banded together, as brothers, to elevate, should never be thus trammeled. No letters patent should be thrown around her outstretched pinions. Naught but the diction of the great Almighty should be interposed to say, "thus far shalt thou go and no further."

On motion, the resolution was then laid on the table until to-morrow.

It will be seen by the sentiment of this resolution, and the remark appended, that there was a decided liberal spirit manifested and upheld by the society, the majority of the speakers being in favor of the resolution. There can be no doubt, that if the motion had been pressed to a vote, the resolution would have been adopted. But without wishing to cut a member off without a chance for reformation, it was thought best for the present, to modify their action.

Consequently, Dr. E. Taylor the next day presented the following, which you will find on page 11, minutes of second annual meeting :

"*Resolved*, That viewing ours as an important branch of one of the liberal professions, we feel bound to disapprove of any member of this society patenting any instrument or mode of practice pertaining to our profession, and that further action on this subject be deferred until our next annual meeting." Adopted.

Such, gentlemen, is the position this society now stands in before the profession. It has declared, that the member who shall patent any instrument or improved mode of practice does that, which, we *feel bound* to say, merits our condemnation.

And now I ask, are you ready to abandon this position ? I hope not, but I must say, I fear for the result. It seems to me this is just the time for men to stand by it. This is just such a case as it should be applied to. For what are the facts ? A member, who has been an officer of this society from its commencement, who has known its laws, and who has sinned against the principles of this association once already, but was forborne with, in hopes that time for repentance would work a change, comes again before the society with what he claims as his improvement, and which he says, will completely revolutionize the practice of mechanical dentistry, and tells us what, pray, of it. I say, literally nothing. True, he says, it is a great improvement. That the teeth are set in a silicious substance. That it fastens them firmly to the plate without soldering. That *he* is satisfied they will stand the friction of mastication. That no mois-

ture can get between the plate and the cement, and that there is no possibility of shrinkage or warpage in the plate in this method of work. But so far from attempting a development of *how* he possesses all these desideratums, not a ray of light is given, unless his answer to a member might be considered such. He was asked how he so certainly overcame warpage. He answered "it was by the use of plaster and a—a—another substance."

Now, sir, I hold that there is as much light contained in his advertisement as there is in his addresses on the subject.

Such, Mr. President, is the result to the society of waiting two years for his paper on artificial gums. He has come before your committee as he has before the society, presenting this whole matter as a secret, and I am astonished that gentlemen who have, in former years, so explicitly and eloquently expressed themselves, should now be willing to vote a gold medal as a reward for this improvement. I call upon them for their reasons for this change of action. Certain am I, that if this society has settled any one point of action, that point is, that it disapproves of patenting such an improvement as is now under discussion.

Again, it is fatal to all the principles of our association, to encourage the course Dr. Allen has taken, and still intends to pursue. I had thought, sir, that our object in forming this society, was to elevate ourselves and the profession we follow, by individual improvement. And that we should meet annually for the *free* interchange of ideas between the members. That these ideas and improvements, if deemed of sufficient importance, should be sent, broadcast, through the profession, and that in this way we would labor to elevate and improve the knowledge and practice of the profession at large. And not that we should come together yearly to eulogise our own modes of practice—hint at the desideratums we have obtained, and the points in which our (secret) mode of practice excels all others, and vote gold medals, as rewards for *such* valuable information. Sir, give countenance to the proposition which was placed in the hands of the committee, or adopt the majority report, and you establish a precedent, which will, if followed

up, eventually result in the destruction of this society. Sir, it undermines the very corner stone of our whole fabric. It says most emphatically, you *may* patent any of your improvements in dentistry, even should this improvement entirely change, and supplant the ordinary mode of practice in an extensive branch. We say, Mr. Patentee, we will give you that which will be of essential service to you, in your legal effort to clip the "pinions" of the profession. In order to gratify you, we will repudiate all we have formerly done. Yield our position before the profession, and retract our words, our motive being only the encouragement of your laudable pursuit.

Mr. President, how shall we be viewed by the profession, if we thus stultify ourselves.

First, then, I repeat, we object to the preamble and resolution which would award a gold medal, on the ground that it is contrary to the expressed will of the society, and subversive of the principles of its foundation to give *any* encouragement to patent improvements. Of this, I trust you are satisfied from the evidence I have adduced. But further, sir, the report I have presented, claims that it is contrary to the views entertained by the prominent members of this and kindred societies, and of the profession at large, who claim for it that it is a branch of a liberal profession, any countenance to those who shall patent improvement in dentistry.

This, we also find abundantly evident in addresses and other papers, as set forth in the periodicals of the profession. Time would fail me to quote a tithe of the matter which might be collected on this head. I will confine myself to some quotations, going to show, still further, the views of some gentlemen, now members of this society. I do this to show that I do not misunderstand their position, and, consequently, do not misrepresent them. First, let me read you a few lines from an address of Dr. E. Taylor, delivered at the third annual meeting of this society, vol. 1, page 6, Dental Register. "We are banded together for the purpose of elevating the standard of our profession. We here form a common fund, into which each member casts, of moral and professional character, his

all. The aggregate, therefore, forms our professional force, and that force will be, of course, greater or less, as may be our individual contributions. That each of us have a large amount of capital thus invested, should be our highest ambition; for thus invested, it yields largely to the benefit of the community, and insures an ample return of interest to each individual stockholder."

We violate the intention of the speaker, but little, I think, when we connect this sentiment with the resolutions already quoted.

I shall read next, sir, the sentiment of Dr. B. B. Brown, late of St. Louis. At the time of writing, one of the editors of the Dental Register. Turn with me to page 45 of vol. 2d, of that valuable work, and we will see what he says on the point.

"The enlightened dental profession must view with suspicion, if not with extreme disgust, every effort on the part of those practitioners who, by means of secret remedies, or "*patent penny whistles*," endeavor to construct fortunes by such mercenary practices as inflict shameful wrongs upon a noble profession, which they, unfortunately, have disgraced in the membership of being so base. They have, undoubtedly mistaken their calling; they should forthwith devote their valuable time and eminent talents to the more appropriate and congenial pursuits of peddling patent washing machines, wooden nutmegs, or white oak cucumber seed." St. Louis Ed.

Bear with me, sir, while I still further read from our Register. I ask your attention to an extract from a valedictory address by Professor Mendenhall, of the Ohio College of Dental Surgery—an honorary member of this society. He is giving what he conceives to be, wholesome advice to a class of graduates, young men, who are supposed to be inexperienced, and in need of being instructed in the principles which govern associative action. On page 113, vol. 3d, he says:

"In regard to the relations you hold towards those honorably practicing your specialty, the same general conditions must govern. While a fair and honorable competition is allowable,

nothing can be tolerated which savors of the spirit of quackery. Every man, before he can expect your fraternal confidence, must practice his profession in an open, candid manner. He must make no exclusive, high-sounding, and noisy pretensions; possess no knowledge but what he is willing to communicate freely to others of the profession of medicine; and deal in no specifics or secret remedies, or plans of practice. This course you have a right to expect of others, and they have a right to demand the same of you. A contrary one must result in a want of confidence, and is mean, undignified, unmanly, dishonorable and disgraceful in the highest degree. The indignation of every member of the profession should be visited on any man who arrogates to himself knowledge and modes of treating disease that he is not willing to scatter abroad among his professional brethren. A sordid spirit of that kind should be rebuked, no matter what qualifications its possessor may have. Every man, also, upon entering a profession, places himself under obligation to that profession to contribute to its common stock of knowledge, and to aid in its elevation and advancement, by adding something to it not before known. Our whole science being progressive, we must assist in promoting its onward march—each in his proper department must exhibit a commendable spirit of industry. We must neither be too indolent, too cowardly, or too proud to aid in fulfilling the mission which destiny has marked out for that profession which has science for its foundation, and the good of mankind for its great object."

Sir, words need not be multiplied to show the application of of this extract to the present case. If its edge is not felt, such is the obtuseness of feeling, that it would be folly to sharpen them, if it were possible.

But what says Professor Taylor, in his valedictory to a smaller class. Listen, sir, while I read from Dental Register, vol. 2, page 122.

"If the prowling, hydra-headed monster of charlatanism rears up his many heads, to mar her beauty, and sully her good name; with the sword of truth, guided by an arm of Hercules,

sever them off, and continue to strike until none reappear, and dentistry, as a science, stands forth pre-eminently beautiful—perfect in every part—the admiration of all.

"Let the ignorant, let the depraved, and the vile, act the part of the quack—but, oh! never let him who hath drank at the fount of knowledge, who hath ever bathed his temples in the refreshing streams of science, or inhaled the fragrant odor of a clear conscience, stoop to her foul embraces.

"Her touch is pollution—her course leads downward and downward—along her path are strewn the victims of her avarice; the shrieks, groans and agonizing cry of the dying, continually pour forth her requiem, and tell but too surely her work is destruction. May she never find a resting place in our profession."

There, sir, is eloquence. Eloquence which must have been inspired by circumstances differing from the present. His "outstretched pinions" could have felt at that time, none of those trammels from letters patent, which is now thrown around him, and which I fear, he is willing now to abandon others unto. But, Mr. President, I must cease quoting; enough has been produced to show the sentiment, heretofore, of some of the members of this society.

I trust, that from what has been said, the members of the society will see that they cannot consistently with their own action and teaching, vote for the resolution awarding a gold medal to John Allen, or any man, for a *patent* improvement.

Another point the report claims, is, that the sentiment of the prominent members of the profession at large, is decidedly opposed to patenting improvements in dental practice. Have I, sir, over-stated the fact. I think not. For not only do they hold this view, but they hold, also, that it is the duty of each individual member, to labor assidiously to improve his own practice by modifications of old modes, but also by the invention of new ones, and that when such changes are *found valuable*, that he seek to elevate the profession in public esteem, and in fact, by improving the general practice thereof, by communicating freely with his brethren, on all such improvements.

Time would fail me, sir, here to speak of a tithe of what has been done by men worthy of our esteem, thus to simplify and render perfect the various operations of our profession, and I know no one here or elsewhere, who is not ready to adopt their improvements or who is not indebted largely to such.

But, sir, as this discussion has been put off until the last moments of our session, and time admonishes me to be as brief as possible, and as action speaks louder than words, I will, for the present, waive any further quotations, and touch on only a few prominent facts which have suggested themselves to me within a short time. First, then, I would call to mind the professional career of the honored and lamented Nasmyth. His life was truly a life of sacrifice to the elevation of the profession. He was one who had few peers in the cultivation of that branch of science to which he devoted himself. His contributions to our stock of microscopic investigation, will long hold a preeminence. He pursued his profession with an ardor and enthusiasm that none can excel. It was not for self he labored, but for you, sir, and you, yea for all of us, for nothing less than the benefit of mankind as a whole. In the midst of business, lucrative and extensive, he found the time, yea, rather took it, took that which was of value above what you can estimate by dollars; that which was essential to his health; the hours in which he should have rested, and devoted them to scientific research. He proposed to throw no letters patent around the "pinions" of those whose impulses might lead them to try this same flight. To all such, he says, pursue it. Here I give you freely my chart to guide you, my lamp to light you, freely you have received, freely give. Hold, says one, he is an author, and as such receives his reward in the shape of profit on his works, secured to himself by his copyright. To such I reply, that no man in lucrative practice, such as his was, can be paid for the time spent in such labor as he performed, from the sale of his works. And further, there can be no comparison between this case and that, because if a patent, such as we now have in view, is carefully drawn up so as to cover principles, *that* especial feeler is shut up from all attempts at gleaning a

cultivation, not so the other, the mind is not only left untrammeled, but united to efforts of genius. We further know that in the case of Dr. Nasmyth, cerebral disease and premature death was the result of his efforts to prepare for the press a work since published. Think you, that if money was his aim he had not a better and easier mode of acquiring it? undoubtedly he had; but Nasmyth lived not for himself; had he, few of us would have heard of him. His name and fame shall live when such patents as this are forgotten.

Authors, such as Fox, Hunter, Fitch, Koecker, Brown, Harris, &c. &c., could be adduced, all going to show the development of the liberal spirit, but to name them is enough to the wise. No one here dare deny that this has been the result of our ablest authors writing on both sides of the Atlantic. Much, however, has been done in our own day, and by men still living, that ought to be here noticed. Let us look at some of those things we are every day using, and which might have been made the subject of patents.

One of the most accomplished dental surgeons of our day is Dr. Hullihen, of Wheeling, Va. Few among us have done more, if as much, to elevate the profession in the eyes of our medical brethren than he has by his practice, whether we view that strictly dental, or his operations on soft parts in close proximity with the teeth. What has he done? He has given us Hullihen's screw forcep, an article which he might have patented, and which would have yielded a handsome return for the labor bestowed in getting it up, but he *would not*. He has also made various improved instruments for the operation on cleft palate, none of which he has thought of patenting. But in the true liberal spirit of our worthy brethren of the medical profession, he publishes all unreservedly. He has also done the same with his experiments for the cure of tic douloureux, which present some very peculiar features of treatment.

An improvement which has been highly lauded by professor Taylor, during this session, for the perfection with which it enables him to insert artificial teeth, is that of plaster as the medium to obtain an impression. To whom is he and the pro-

fession indebted for this valuable mode. We must, to the best of my knowledge, give the honor of its introduction as well as the honor of *not* patenting it, to Drs. Dunning or Dwinelle, it may be due to both of them equally. Again, sir, we have the opinion of the profession on patents, shown in the controversy on the Lethean patent. Some would say that Dr. Morton was compelled by the sentiment, of both medical and dental profession, to abandon the unprofessional course he had followed; but it may be both wisdom and charity to admit that the doctor was *convinced* of his error, in part at least, by the arguments adduced by his opponents. Another matter which has been made the subject of several patents is the cavity plate. And who of this society, I will ask, has not in practice refused to acknowledge the rights of the various patentees of chambers. Gentlemen tell us they have tried *all* modes, they must then have tried patent ones. Have they paid for the right? I venture to say they have not, and do not intend to. They do not recognize a moral obligation in the matter; they will fall back, when necessary, on the chamber of Dr. Flagg, or some other liberal inventor, and still we will hear of the necessity of encouraging and rewarding the patent inventor; verily men change as well as times.

We have heard much lately of the value of arsenious acid as an agent to destroy the exposed pulp of a tooth. This also is a thing which might have been patented. But Dr. Spooner was too much a medical man not to see the illiberality which such a course would manifest, therefore, he *gave it* to the profession. But, sir, if I were to dwell on this head, I would weary your patience with the recital of that which every dentist who has read must be familiar with. In a word, I would ask you all, particularly the younger members, where did you get your knowledge? have you each and all discovered the modes you practice? are you not rather indebted for nearly all, if not the whole you know, to others. Have you not often felt thankful for the timely advice of your seniors. Do you not rejoice that the day is gone by, when to announce yourself in the office of a dentist as a dentist, was tantamount to an invitation to him

to close his operating case. For one I am, and I am glad I never experienced such treatment, and for one, let others do as they may, I will resist every thing that looks like the return of it, let it come howsoever insidious, or under the auspicious patronage of men however high in professional places. For one, I say, let us march onward, not backward.

I believe, Mr. President, that I speak the truth when I say, that a more thorough knowledge of the science of dentistry can now be acquired in two years, if the best means are taken advantage of, than could in ten, if not twenty, years, by the older members of the profession.

The reason is, that in their young days the ruling principle was *secret improvement* and secret practice. With few exceptions each had to teach himself. While in our day the ruling principle is the *liberal instruction of each*, *no secret improvement*, *no secret practice*.

To the American Society and its founders there can be no question we owe much, very much. It is the parent of all the associative advancement the profession has made. It was the lap from whence the seeds were scattered, the fruits of which both old and young, but especially the latter, are now gathering. By it was issued the first dental periodical, to be used as a vehicle by the profession for the interchange of views. It was one of its prime movers that gave life and being to the first dental college.

To the impulse given by the American Society are we also indebted for the formation of state societies and the publication of various periodicals, devoted entirely to the discussion of dental practice, all of which, I believe, have uniformly sustained the principles involved in the minority report. And for our journals and societies to act otherwise, would inevitably prove suicidal to them.

But, Mr. President, I ask you to look a little further into what individual effort has done for us. I have before named Dr. Solyman Brown. He, sir, was one of the first to break through the trammels which narrow selfishness had thrown around the practice of dentistry. Who is there that can read his treatise

on mechanical dentistry, and not feel a generous impulse from the truthful liberality which evidently guided his pen. Ancther man whose name is more in the ears of the profession than most others, is professor C. A. Harris. Look with me, if you will, at the labor he has performed, both alone, and in conjunction with his colleagues in the college, and on the tripod, in order that the feelings, intercourse and practice of the profession might be liberalized, and made to be known and acknowledged as a liberal profession.

Is there nothing, yea, is there not much, gentlemen, which you all are constantly practicing, which you have derived, directly or indirectly, through their labors. Are there no instruments or modes of practice essential to your success in business, which he or some of his colleagues had the legal right to have patented; undoubtedly there are, but to these, honor is more than money, and respect more than notoriety.

I have before me, sir, the names of many men, whose minds and souls are of a similar mould to these, but time prevents my dwelling longer on this point. I will name but one more member of the profession, and he, only to contrast his previous action with his present, in order, if possible, to convince him that he is inconsistent with himself. I allude to Dr. James Taylor. As you all must now know, he has, this day, stultified himself. He is now upholding and supporting a man who has secrets in his practice and *holds* them for sale.

Now, sir, let me here say, that if there is any one thing Dr. James Taylor has been known for in the west, more than for any other, it is, that he has been willing to communicate freely with all. .Especially have I heard this said of him by those who knéw him, at least professionally.

Now, sir, let Dr. Taylor pursue the course he has this session commenced, and his honor must inevitably wain. Let the society adopt the course the majority of the committee propose, and I will hold, that it also has, in that act, turned its back on all it has gained. Let it pursue this course, and it inevitably sinks itself in the esteem of the liberal minded.

One thing, all know, who are observant readers; and this is, that the profession has improved its practice very much within

the last ten or fifteen years, and that this improvement has, in the main, been brought about, as I have pointed out. But, sir, we are indebted to a class of men, not members of the profession, but who have, nevertheless, manifested a degree of liberality that would put to shame many who claim to be of it. We are indebted to various instrument makers for many of the perfect adaptations of instruments to the several uses to which they are applied. One, I will make particular mention of; Chevalier, of New York, has given us the most perfect file-carrier ever used. He has given us, also, an excellent foot lathe, and a drill stock. He has also made various improvements in forceps. All of which, he could have patented, and prevented others from manufacturing the same. But he partook too largely of the spirit which he knew existed in the profession, therefore he *would not*. He says to his fellow tradesmen, I ask only honorable competition, let the market be with him who makes the best. My improvements I give to the profession, if you manufacture so as to suit them, I am satisfied, I interpose no barrier.

See, also, how much has been done by both manufacturers, to enable us to perfect our artificial work. They have produced much that might have been made the subject of patents, but they would not. They also have said to the profession, buy where you can get the best article, buy where industry has produced the greatest success. And to their co-laborers in the same field, do what we have done if you can, we throw no patent barrier across your experimental path. Yes, Mr. President, they also are trying to teach some of us liberality. Some there may be, who have become too old to learn this lesson. But let me beseech those who have not only learned, but themselves taught this lesson, not now to abandon it and yield the palm in liberality to men who do not claim for their profession, "that it is a liberal profession."

There is still, sir, one other point in my report which I have said nothing upon, and can do little more than remind you of it. This is, that neither your committee or the society have had *any proof* that the change is an improvement. No cases have been presented which have been in actual use in the mouth for *any* length of time.

However beautiful the work may be, (and I acknowledge it looks fine,) I would advise that this society pass no recommendation of it either in the shape of a gold medal, or of the resolution offered by a majority of the committee. I would advise this course, even were there no intention to patent it. One year's practical test will be none too long to try its merits on the mouth. We should, I think, sir, let experience have its due influence on our minds. Let us not be dazzled by appearances. This would not be the first wonderful thing that has vanished, when the practical application has been undertaken. To go no further back, let me ask where is its immediate predecessor, I mean "Dr. Allen's improvement for restoring the contour of the face?" Gone sir, gone into oblivion, because of its impracticability.

Dr. Allen. It is not so, Mr. President, that thing is of just as much value as it ever was, it has not proved impracticable. The very first case in which it was applied, it is still used. It is true I have not pushed that matter much lately, but this was because I have been so much engaged in this matter.

Dr. Leslie. Does Dr. Allen still wear one in his own mouth.

Dr. Allen. Yes sir, I have the improvement now in my own mouth, and if the society desire it I will show it.

Dr. Leslie. I will not, Mr. President, deny what Dr. Allen says, but one thing I must say, Dr. Allen does not look near so fleshy in the face as he did about the time he received that gold medal. "The contour" has evidently changed since that time. This, I think, all Cincinnatians must observe.

But to proceed, let us learn, gentlemen, by the experience obtained from the hasty action of a kindred society, regarding his contour improvement, to avoid the trap before us, and neither reward or commend an *untried* article. And especially one which *we know* will be patented if Dr. Allen can effect it.

When the American Society voted Dr. Allen a medal for his invention of an instrument "for restoring the contour of the face," it done it with the understanding that he presented it to them and the profession at large, on the broad basis of adding

something to the common stock of liberality, which the society as a unit were using as a lever, to elevate the profession. And when I say that had that society known or supposed Dr. Allen intended patenting that invention, no medal would ever have been voted him by that honorable body. *I know* I say that which I have the best authority for stating. No, sir, with half the facts we have in this case, they never would have done it in that.

But there are other reasons over and above those given in the report I present, why we should act with caution in this matter.

Even were there no objections to a patent, and that it was fully proven that all that is claimed for the specimens before us is correct, and the practicability of the thing established, still I would be constrained to inquire further into the matter. I would ask you, gentlemen, are *you sure* Dr. Allen is the individual entitled to all the credit given in the preamble and resolution of Dr. Goddard in the majority report. Permit me to say, I think he is not, and I shall as briefly as possible present you my reasons for holding such belief. Premising that I am prompted in all my action in this matter, solely by a desire to do justice to all. I have ever held it to be a very essential principle of professional action, to scrupulously yield to each member of the profession, full credit for whatever I may have received from him, and not allow myself from personal feeling to either under or overrate their actual worth. What I shall now state, I wish the society to know, has already been made known to him by myself, and I now repeat it. In order that if I am in error, the Dr. may have a public opportunity of setting me right, and correcting what is publicly spoken of in Cincinnati. I wish the truth always in all matters, and nothing but the truth.

Dr. Allen, I repeat, is not, in my opinion, (and I have endeavored to form it carefully and candidly,) the inventor of all he claims. Here are my facts on which I base this opinion. I assert first, that it is a fact, that so far as the profession in Cincinnati is concerned, we know nothing of Dr. Allen's ex-

perimenting, in order to procure an artificial gum which he could flow around ordinary plate, or other single teeth *until after it had been announced that Dr. Levett had patented a mode of enameling plate work. Shortly after* said announcement, Dr. Allen first exhibited to several persons some of such kind of work. This was towards the fall of 1849. These specimens were not satisfactory to the Dr. himself or to those members of the profession who saw them. In these specimens he applied the gum or enamel *after the teeth had been backed and soldered in the usual way.* His only object was to cover what plate was not hidden by the teeth, and to fill up between them so as to prevent the lodgment of food there.

It was owing to these experiments, I suppose, some members of the society suggested at the meeting held at Louisville, September, 1849, that Dr. Allen be appointed to prepare a paper on the subject of artificial gums to be read at our next annual meeting. This appointment the doctor accepted. And how, sir, has he filled it? At the next meeting he was absent; at this one we have no paper, although he has had two years in which to prepare it. But, sir, to pursue the point now before me, I would inform you that about this time, the agent of Dr. Levett visited Cincinnati, he called upon Dr. Allen and and sold him his secret. I have been informed that he purchased the *sole* right to use it in this city and county, and for it paid a good round sum. Liberal, was it not? Whether or not it proved useful to him we know not; but that he continued for a short time endeavoring to flow an enamel on *soldered* work we have reason to believe, but that he met with the success he wished for, at that time, I believe he will not attempt to claim. One thing we in Cincinnati know, is, that in a few months he ceased to mention it. There were too many plates melted, and teeth cracked, for it to be considered an improvement, so the doctor followed again the old mode.

One idea, however, you must perceive he derived from the announcement of Levett's patent, and this the enameling of plate in artificial dentures. This is an essential idea in the mode Dr. Allen claims, and evidently lays at the basis of all

his experiments, let the credit be with the inventor of it, viz. Dr. Levett.

Another very important part of the invention I will lay claim to on behalf of another individual, there being not the *least* doubt in my own mind that from him Dr. Allen has directly or indirectly received it.

You are aware, doubtless, that in these specimens presented here by Dr. Allen, that single teeth are set into a base of a silicious nature, which when fused makes them and the base one. Now, sir, I need hardly point out to you, that this thing of using single teeth in this way, is the most important idea of the whole matter. It is the *suggestive* one which prompted the doctor to look around him for an enamel or silicious substance, by which he could produce something resembling that which another person had already effected.

Now, Mr. President, so far as my knowledge of experiment in Cincinnati is concerned, (and I have been careful to keep posted up in such matters as have been in any way made public,) I am *certain* that to Dr. Wm. M. Hunter is due for the credit of first having used single teeth in this way, in Cincinnati. As far back as the spring of 1846, I was aware that Dr. Hunter was engaged experimenting in the improvement of block work, by overcoming the shrinkage and reducing the labor. He then showed me specimens of what he had accomplished in this way. And one fact he *then* explained to me was, *that he could insert single teeth in a base*, (silicious of course,) and fix them there by fusion of the base, thus doing away with much carving and overcoming part of the shrinkage. I have been shown several of his specimens occasionally from that time to this. Dr. Hunter has several modifications of the same principle. One of them is to mould his base, as he would in ordinary block work on his gold plate, the teeth are then arranged in this base, this is removed from the plate, placed in a muffle and subjected to a fusing heat. They are then ready to be attached to the plate which is done by backing and soldering as ordinarily followed, or with the continuous backing.

Another mode is to take a piece of thin platina plate, say six

or nine lines broad, and the length of the ridge of the mouth, this is notched on the edge so that it may be bent into the curve of that part of the alveolar ridge on which the base of the teeth sit, it is then struck up over the gold plate, the inner edge is notched so that it may be bent up behind the teeth, these parts are punched so that the lower pin may be inserted; this, when riveted, holds the teeth in place. A base or body is now filled in around them, and the whole subjected to a fusing heat; when removed from the muffle, the platina and base are united; this is next placed on the gold plate, gold backings are now attached to the upper pins, the surfaces of the gold and platina plates are boraxed where they come in contact, solder is applied, and the whole placed in a muffle and the solder fused, resulting, Dr. Hunter informs me, in a perfect union of the gold and platina plates. Specimens of both these styles, the doctor assures me, he has sent to the world's fair. That Dr. Hunter sent specimens there, the profession in Cincinnati, and I suppose elsewhere, know full well, for it was announced in the published lists months before Dr. Allen exhibited any specimens of his recent improvement. The specimens of Dr. Hunter were also a subject of professional conversation in Cincinnati, he having shown them to several persons before sending them to London, and was not until months after they were sent away that Dr. Allen produced any thing like them. This then, gentlemen, I believe to be another important reason why Dr. Allen should not have a gold medal, or have this thing recommended as his improvement.

But, gentlemen, this is not all. Circumstances which have have more recently transpired compel me still further to question his claims, a portion of what I shall now state is *fact.* From this I have drawn some inferences; the first, I trust, you will believe, the inferences you must judge the correctness of. The individual whom I shall presently name, makes assertions, these you must estimate for yourselves. My object in alluding to them thus publicly is to do that which I have done privately to Dr. Allen, give him an opportunity to prove that false which is publicly stated in Cincinnati. The profession in Cincinnati

have been waited upon by a gentleman by the name of Steemer, with an improvement similar to the one before us, offering to teach the profession for a consideration, the method of manufacturing the enamel and gum, and of setting teeth just in a similar manner to that of the specimens of Dr Allen.

This I know to be a fact, for he showed me specimens of his work. I will not say it was done in such a workmanlike manner as a dentist might do it, but the principle evidently was there. True it was, that the arrangement of the teeth was bad, but that was nothing when estimating his knowledge. What he had for sale was his knowledge of enamel, and the *mode* of operating.

As to the capability of that he showed me being able to resist acids, I am satisfied. And the specimen I tested being on silver, (he also showed me some set on platina,) it must of course have been largely composed of glass of borax. Hence, that such as could be used on platina or gold, would be able to stand the fluids of the mouth, I feared not. It was that I had put a portion of his specimen into concentrated sulphuric acid, without producing change in it, that made me indifferent to experiments proposed in committee, with acid tests of those specimens of Dr. Allen.

This, Mr. Steemer tells us in Cincinnati, without the least hesitation, that he has sold this receipt to Dr. John Allen, and also to Dr. Darling. From the latter, he holds a certificate of that fact. And that he rendered some services to Dr. Allen, he, Dr. A., has admitted to myself. Dr. Allen, it is true, denies that Steemer has taught him this mode of setting teeth, or that said Steemer invented it. This, sir, is denying more than I have any idea of claiming for him, for you will perceive I have already set aside the leading and chief points to two other individuals. I know not, sir, that for Mr. Steemer, I will positively claim any thing, until I have further proof of his assertions. But, sir, from some *facts* I will draw some inferences. If these inferences are incorrect, Dr. Allen will oblige me much, and serve his own cause, by proving them so, and that the *facts* are misunderstood. I know I consult his own good,

however much I may risk my own immediate welfare, by giving him this public opportunity of proving that to be false which some suppose to be true. Truth is what I suppose we all want on all subjects, and it is my love of it and justice, that prompts me to stand here alone, I fear, on the side I am. But to the facts and inferences. This Mr. Steemer spoken of, is a German by birth, and has been reared an enameler, and public reputation accords to the Germans a creditable standing in that occupation. He was induced some few months ago, to enter into some business arrangement with Dr. Allen; what the precise nature of it was, I am not fully able to say. I would not presume that he engaged to teach the doctor dentistry. But, Mr. President, we in Cincinnati, know that it is only two or three months since Dr. Allen first showed specimens of *this kind* of work, possessing whatever degree of perfection it may now have. And that this improvement has been all made, so far as the profession in Cincinnati know, *since* this gentleman formed a connection with the doctor. It is also a fact, as has been stated by Dr. James Taylor, in the last number of Vol. 4, Dental Register, in his remarks on Dr. Allen's *first announcement* of his improvement. "That we regard the color of the gum which the doctor uses, as much improved since we first noticed it."

This improvement of the color, be it remarked, was also made after Mr. Steemer and Allen's connexion.

From these facts, sir, others as well as myself, have inferred that Mr. Steemer must have been of essential service to the doctor. Not that Steemer had ever set teeth in this way before he saw Dr. A., or that he suggested the same to him, I have, I think, shown you that suggestion the doctor received from another source. What then was that service. The doctor, I infer, possesses as the result of his former experiments the knowledge of an enamel, in the use of which he could not obtain a good gum color, probably by combining in it a good share of glass, containing metallic oxyde, (lead or zinc,) which changed the gum. Now, Mr. Steemer having been accustomed to prepare enamel for culinary vessels, in which was required

great cohesion to a metallic surface, combined with the power of *resisting acids*, and the *absence of oxydes of the baser metals*. I infer, that of him the doctor obtained a knowledge of the *materials* he had been "*so long*" in quest of. In a word, that Mr. Steemer gave to Dr. Allen the knowledge which *enabled* him to make a profitable use of the two other principles which he received of Drs. Hunter and Levett. This, sir, I contend, is a just inference. It is the most natural one to be drawn from the facts of the case.

If I have been misinformed as to the circumstances, it should be easy for Dr. Allen to prove his position. Until he does so, I must view Dr. Allen as claiming that which he has no title to, and for one, reject the proposition of the original mover, and the majority report.

But, Mr. President, I am not disposed to leave the matter without a word further. I have said much, I know, which detracts from the claim of Dr. Allen, but I am conscious I have endeavored to do it justly.

There is one feature of these specimens which I confess *is new* to me. This is his *depending upon the adhesion of enamel to the plate, as sufficient to retain the teeth as firmly as when soldered on*. If this, after sufficient *practical test*, is substantiated, I will say that *this* is a valuable idea added to our stock of knowledge. And to Dr. John Allen will I give credit for *it*. But, sir, to this, he must grant time. Let us be cautious, remembering that more harm results from precipitancy than the opposite.

Dr. James Taylor. Mr. President, I am willing to confess that my mind has been changing for sometime on the subject of patents. It is true, I have heretofore stood, as the extracts read by Dr. Leslie show, and I need not refer to them again, to show where I have formerly stood, Dr. Leslie has done this so well, that I am saved that trouble. My views on the subject of patents, now is, sir, that it would be best to grant this right to the members of the profession, so far as regards the patenting of any thing strictly mechanical. But, sir, I would be as much opposed as I ever was to the patenting of any thing not

mechanical, to the patenting of any thing in our profession, calculated to alleviate the sufferings of poor humanity, in the treatment of disease. The man who would do this, would be unworthy of professional fellowship.

Dr. Leslie. I would ask the doctor to explain, when he says he would not agree to the patenting of any thing not mechanical, does he mean that any medicinal compound preparation, or simple, calculated to remove or relieve disease or suffering in the mouth, should never be patented, but that all of dentistry aside from this, may be.

Dr. Taylor. Yes, sir, that is what I mean. This course may be pursued without injury to our patients, and leaves us room to encourage those who are indefatigable in their labors to improve the practice of dentistry. This principle is allowed by the members of the medical profession. It is but a few days since I was shown a stethoscope, invented and patented by a practicing physician of Cincinnati.

It is viewed as a valuable improvement, so much so, that I think no physician will, hereafter, make an examination of the lungs without this improved instrument.

Dr. Leslie asked, if the inventor is a member in good standing in the medical society.

Dr. Taylor. I believe he is, and he is known to be the inventor. Besides, this is no new thing for physicians to do. There are trusses innumerable, and very many supporters which have been patented by respectable members of the medical profession, and which are recommended by the eminent physicians.

There has also been numberless surgical instruments secured to the inventor by patent. So that you see, sir, the position I now stand in; with reference to patenting, is that allowed and upheld by the medical profession.

That to Dr. Allen should be granted the right to patent, seems to me but justice, having, as he says, devoted a great deal of time and money to the development of this important improvement, for important I believe it to be. It would be expecting too much that a man should devote years of study and labor without a reward, and I think, Mr. President, it is the

least we can do in this case, to adopt the proposition of the majority of the committee, and recommend to the *profession* this improvement.

Dr. Leslie. Mr. President, it makes me smile to hear Dr. Taylor speak as he does, so very ridiculous does his position seem. It reminds me, sir, of the old story of the Irishman's gun. *Now*, the Dr. is willing that if you protect poor suffering humanity from the evil effects that might flow to them from granting to members of our profession the right to patent the medicines they may make use of in dental practice. Why then he rests satisfied. Cut off the right to the patent use of that the Dr. has little use for, very little use for, I may say. As the treatment of disease in the mouth by him or dentists generally, beyond what may be successfully treated by an astringent or stimulant, or the lancet, seldom occurs. Grant this, I say, and he is willing you may patent anything applying to the whole or a part of the balance.

And yet, the Dr. would have us believe he is still contending for something grand, something worthy of a liberal member of a liberal profession. It is this makes me smile. It is this reminds me of the Irishman and his gun in need of repair. He said it wanted a new stock, yes, and a lock, aye and a barrel also ; when fully examined, his gun only consisted of the flint. Now, sir, I hold, the Dr. is in a worse plight than the Irishman. Let him deduct from his practice, that portion in which he uses a medicinal preparation and he will find the value of such portion exceedingly small.

He will, I feel confident, have not enough to form half a flint. Sir, it is idle for him to attempt to lead us astray in this way. He now follows only the *shadow* of a resistance to patents. He has in fact yielded the whole ground he once occupied, having some reason, therefore, which you must have noticed he has not even attempted to state, although I have called upon him for his reasons, and do now again urge upon him again, for I have no desire to stand alone in this society. If he has sound reasons and correct motives to influence a change in my action, I pray him to make them known. Until these are produced, I must hold the doctor has made a very lame defence.

Dr. Allen. I know not, Mr. President, that I am entitled to speak in this matter just now, as so much time has been consumed already.

Dr. Leslie here remarked, that he hoped Dr. A. would be heard with all patience, and be given unlimited time, for any remarks he may have to present, inasmuch as his claims had been explicitly denied him.

Dr. Allen resumed, and said, that it always had been and supposed would continue so, that so soon as an individual presented something of value to the public, there would be found those who stood ready to rob him of all the honors that attached to him. Of this man Steemer, he would say, there was no truth in his statement that he had taught him. Just look at it, here comes an ignorant Dutchman, a man that knows nothing of dentistry, and claims to have taught me how to set teeth in this highly elegant manner. Sir, there is no truth whatever in it, I have got no valuable idea from him. The true history of his connection with me is simply this, I had been engaged for years at a cost of much labor and time experimenting in this thing. Owing to a press of business in which my own and my students' time was fully taken up, I could not find time to pursue my investigations in this matter as steadily as I wished; I, therefore, at the suggestion of one of my students, who was acquainted with Steemer, and knew in what he had been engaged, employed him, and put him in my laboratory, that he might assist me in this matter by grinding materials, &c. to which I could not spare the time of either of my students. When there, of course he had an opportunity of ascertaining what I was after. We little supposed at the time, he was stealing from me the principle on which I do this work, but so it has since proved. He was there as a mere assistant, and for his services rendered, I paid him *well*, and it is hard if he is to step in and rob me of my dearly earned rights. Why, he never set a tooth in his life, and never saw teeth set in this way until he saw it in my laboratory. He never attempted it until after he left me, and now he is going around offering for sale what he has stolen from me. And some people will rather pay him

for his stolen goods than come to me. The reason is, they are not willing to allow me the credit.

But, Mr. President, the thing, this man Steemer says, is the same as mine, is it not? although he stole a good deal more than I had thought at first. He, however, cannot do or teach any one this kind of work. He has as yet sold it to only one individual, (Dr. Darling, of Cincinnati,) and he is satisfied that it is perfectly useless, and has applied to me to be taught my mode, and he is now waiting my return, in order that he may obtain a knowledge of it. Why, sir, what has this man been that he should set himself up to teach dentistry? only an enameler of pots, nothing more. I have not, sir, come prepared to meet the matter as it has come before us, if I had thought it necessary, or were there time now, I could produce affidavits from my students, to show that I have done this thing before I ever saw Steemer, but I did not think that any one was going to lay claim to it. As to Levett's enamel we all know, that it is of no use whatsoever, so that he has not helped me any. As to Dr. Hunter's improvement, I contend there is no similarity between them. This is entirely different from what he has done, so I have nothing more to say on that head. But it has been said I have no right to patent this thing. Why, sir, this would be a pretty way to encourage men to spend their time and money to improve and elevate the profession; just so soon as he has obtained any thing of worth, he must give it all for nothing.

He may have pursued it after others had been hours in bed, still, he must plod away, and spend vast sums to discover this thing, and then not get any return. It is, sir, I think, essential to the improvement of the profession, that we recognize the right to patent improvements. This course has been found necessary by our wisest legislators. They have enacted laws for the encouragement of national effort, and the protection of individual right to inventions. Our own government has established a separate department to watch over this matter, and unless we agree to do the same, the result will be, that every man will keep his discoveries to himself.

Dr. Goddard had little to say on the matter.

He thought it evident, that we must encourage all meritorious discoveries, and we could not expect that an individual having made great sacrifices of time and money to make a great improvement, should give this to the public indiscriminately, without any reward. And until such time as we obtain some such system of national rewards as exists in France, we must grant the right to patent such improvements as this. We know that Dr. Allen has been engaged for a long time, and spent much money experimenting in the matter, and now, that he has arrived at perfection, I think it is as little as we can do, to pass this resolution, offered by the majority of the committee.

Dr. Leslie. Mr. President, it may be right for Dr. Allen to use those words, stealing and stolen so frequently as he has, but it does sound to me very harsh on this floor, (Dr. Allen remarked, best to call things by their right names,) the Dr. may be justified in it by the facts, but I doubt it. That the Dr. has not denied any of the *facts* I stated, I suppose, must have been observed. That he denies only one of my inferences is another point, I wish you should notice. He brings no *proof* to his support; he deals only in assertion, and speaks of what he can produce, if time is afforded. This proof, I will anxiously wait for, hoping, for the doctor's sake, he will present it soon.

There is one other point, I wish to make on his remarks, as to the necessity of granting him a patent, that he may be enabled to reap a return for his labor and money. He says, that unless he obtains a patent, he will be robbed of both money and fame. In this, he allows his fears to carry away his judgment. *That* is, *if* some of his statements be correct. In the first place, he tells us, that a necessary knowledge of his mode can only be acquired, successfully, through the *personal* instruction of some one who understands it. Now, as he says, that Mr. Steemer does not know his mode, and as we find the Dr. so careful not to communicate any of the secret to us, I infer, that no one knows it but the Dr. and such others as he may have communicated it unto.

Of course, then, the secret laying in himself, to secure him-

self, he has only to sell it, with the understanding that they teach no one for or without a consideration. Let him pursue this course, and you perceive, he has the control of the market in his own hands, just as effectually without, as with a patent.

But, sir, I will remark further, before I take my seat, that the gentlemen who have opposed the views I have presented, have given us no reason for retiring from their first position, by awarding the gold medal. The *same* gentlemen, be it remarked, who moved and seconded that measure, now bring a resolution, cutting down, very materially, the honor they first intended conferring on Dr. A. They have reduced it to a simple commendation, and this course they adopt, be it noticed, *before a single word of* discussion has taken place, and now, they give *no* reason for it. Verily, they abandon their friend very unceremoniously. Truly, he may have cause to say, "save me from my friends."

I cannot imagine the cause of this change of tactics. I *know* it could not be the *cost* of the medal, for this the Dr. tells me "he will spare the society, (it being poor,) should it see fit to vote it him." Gentlemen, if you believe, as your preamble and resolutions say, why, sirs, vote him the medal at once, it will cost you nothing. Mr. President, I have done with this matter for the present. I am willing the minority report now go to vote. I may stand alone, but, truth compels me to vote for it if no other member does.

The President now took the vote on the acceptance of the minority report. A majority of the members voted in favor of its acceptance, thus entitling it to appear on the published minutes.*

The motion which had previously been offered, to adopt the majority report, was now renewed, and the vote taken, resulting in eight yeas and one nay. Dr. Leslie here requested that the vote be recorded, with the names attached. This was re-

*I perceive that Dr. John Allen, the Secretary, or Dr. James Taylor, the Editor, has, without any right or justice, stricken this report from the published minutes of the Register. For this, I shall, at the proper time, call them to an account.

fused by the chair, who, together with Drs. Goddard and Taylor, held, that it would be equivalent to taking the vote again. The only way to reach it now, was by a vote to reconsider the matter, or a motion to record the names.

Dr. Leslie held that this was a mere evasion. All *knew* what the vote had been, no one voted against the motion but himself, all he asked, was that the names be recorded; he hoped gentlemen had not done that they were ashamed the profession should become acquainted with. If they had done so, they had better retrace their steps at once. Inasmuch as he had not voted in the affirmative, it was not in his power to move a reconsideration, and as no one who had, offered to do so, the other course only was left open. He, therefore, would move that this vote be recorded.

Dr. Goddard said he was willing that his name might be attached to his vote, he would, therefore, second the motion of Dr. Leslie. The society now voted on this resolution, but it was negatived.

Dr. Goddard arose, and said he had a motion to offer. He remarked, Dr. Leslie thinks he has got us just where he wants us. Ah, he says to himself, I have you, now I will keep you to it. He thinks we have no way to get away from him, but in this he is mistaken, as he will perceive. I now, Mr. President, offer the following:

Resolved, That the preamble and resolution which was referred to the committee, with all debate attending it, be expunged from the minutes, and the report offered by the majority of the committee, be substituted in its place.

This resolution was promptly seconded, and Dr. Taylor remarked, that it had appeared evident from the beginning that Dr. Leslie had determined to force this matter upon them. Now, the fact was, that it had been introduced in the form it was first presented in, without due consideration, and although I seconded the original motion, it was not, therefore, evident I was in favor of it. Upon reflection it appeared to me best to change the method of recommending this improvement, and in order that the minutes should present a proper appearance, I

think it best to expunge the original preamble and resolution, inasmuch as we have adopted another course and so that there will not appear anything conflicting in the published minutes.

Dr. Leslie. Mr. President, I understand this move perfectly, it is simply an attempt to cover up that which, I am satisfied, some are ashamed of. It is an idle attempt to place their light under a bushel. But let them be warned not to attempt that which they cannot effect. Their *acts* are now *facts*, and all they can do cannot make them less. Let me say to them, that if they expect by this resolution to expunge their course from my memory, such an attempt is utter folly. Or if they expect by it to tie my tongue and prevent my speaking of their acts, that is also folly. They will find it better, far better to allow the minutes to stand as they are. If they have done that which, on consideration, they have discovered to be wrong, why not acknowledge it like men. It would be nothing new. Wise men it is said, change often, fools never. Besides, some of their acts will become known, but their not appearing on the minutes, some will be left to surmise respecting them, and as surmise is generally worse than reality, they will, if they pursue their course find that their last state is worse than the first. Further, sir, the charge that Dr. Taylor throws out against me of having from the first forced this course upon them, I deny utterly, there is not, sir, any truth in it whatever. That you may see this, let me review the history of yesterday's session, and you will see where he should have laid this charge.

First, we had the short address of Dr. Allen on his improvement. Immediately after this, Dr. Goddard rose and read the paper he had prepared, viz. the original preamble and resolution. To this, Dr. Taylor pretty promptly responded with a second. Then, without a minute for discussion, or a word said, the president was proceeding to take the vote. At this juncture, I arose and arrested that act, desiring to discuss the matter before the vote should be taken, this, of course, could not be denied me. But being too near the hour of adjournment to enter into the discussion to the length I expected, I at once moved the resolution be laid on the table until the after-

noon session. In the afternoon we met: the chairman declares the first business to be the consideration of this resolution. Dr. Taylor rises and says he would like to withdraw the original resolution, and offer one he held in his hand. To this, I objected, on the ground of its not being according to correct order. I held that a resolution could not be withdrawn unless mover and seconder united in the request, and the body consented. The chair thought differently, and decided the seconder could withdraw his second, and that if he did so, the resolution was no longer before us. Dr. Taylor said he would then withdraw his second. To this, I also objected, and held, that after a resolution was moved and seconded, and announced from the chair, it ceased to be the property of the mover and seconder. That they had no control over it, that they could not, either singly or combined, withdraw the motion, without the consent of the body, or that either mover or seconder could withdraw said motion or second. This position not only the chair ruled to be wrong, but he was supported by Dr. Taylor and several members, and so evident was it that the majority differed with me, that had the decision of the chair been appealed from, I have not the least doubt the chair would have been supported.

It then occurred to me that, inasmuch as Dr. Goddard, the mover, was not present, it was a courtesy due him by the society, that his motion should not so unceremoniously be set aside without his presence. This I named to you, and its justice at once perceived, and the further consideration waived until he might be present. When he came in, Drs. Taylor and Griffith's position was stated by the chair, when Dr. Goddard arose and said, "that Dr. Taylor *could not* withdraw his second. He might, if he chose, offer a substitute, or as many amendments as he pleased, but the original resolution he could not withdraw, without the consent of the society. That a motion, as soon as moved and seconded and announced from the chair, it became the property of the body, and could not, by the combined or separate action of the mover and seconder, be withdrawn without the leave of the body. This, he was *positive*

was according to Jefferson, and governed in all well managed societies." Now, sir, this was exactly what I held a few minutes before, but was overruled and opposed in. But, no sooner does Dr. Goddard state it so positively, than the same men who opposed me, yield all up to him, and that *without any discussion*, and *without one item of proof*. Now, sir, I think, if any one *forced* this matter on Dr. Taylor and the society, it was Dr. Goddard.

But, Mr. President, if Dr. Taylor should suppose, that since the gold medal resolution has been brought before us, I am desirous of keeping it there, let me assure him, that, in that he would be correct. I have had no hand, whatever, sir, *in bringing this matter here*, but, since he and his colleagues have put it upon the minutes, I am determined to do all in my power, that is proper, to keep it there. I want the profession to know what they have been willing to do; and the Dr. should thank me, that I prevented the vote from being taken so promptly as it was about to be. By my course, he was afforded time for reflection, and saved from a serious mistake. No, gentlemen, seek not to bury the record of your acts. What you have done, if it is right, stand up to it. If it is wrong, acknowledge it, and if you sincerely repent, it may be forgiven. One thing that prompted me to be somewhat tenacious in holding on to correct order, was the improper and unfair means Dr. Taylor made use of to get rid of the resolution. Look at his course in committee. This morning when I reached the hall, no report was shown me until I had asked for it. When obtained, I soon perceived that he had made a change he had no right to do. I found he had copied off the lengthy preamble which had been referred to the committee, certainly an unnecessary labor, the original being plainly written. But his object appeared at the foot of the page. I found that he had, on his own responsibility, expunged Dr. Goddard's resolutions awarding the medal, and to make it look the original, he had inserted the following: "Therefore, *Resolved*, That we appoint a committee of three, to examine said specimens." This, sir, I at once objected to, and insisted on the correction. In this, Dr. Goddard con-

curred, and he inserted his original motion and scored out the other. This, gentlemen, you can call by what name you think best. That I detected and corrected action on him, which I thought him above, is most certain. It was then evident to me, why he had not offered to show me the report, or ask my signature to it. You can judge now, who has sought to force matters.

I defy him to show, that I have for one moment, deviated from that which was strictly correct and according to truth. All I have done, I am willing all men may know and judge, will others do the same? Before I sit down, I will, to test this again, move, that when we vote on the expunging resolution, we shall do so by calling the roll, and that the vote be entered on the minutes.

This, Dr. Goddard seconded, and the vote being taken on this motion, it was adopted. The question being now called for on the expunging resolution, Dr. Goddard said, that, inasmuch, as the vote on this resolution would, undoubtedly, be the same as the vote on the adoption of the majority report, he would propose, if it would better satisfy Dr. Leslie, that we would consider the vote taken on this resolution as that taken on the other, and that the names obtained as the vote on this, should be inserted as the vote on the majority report, and attached thereto.

Dr. Leslie remarked, this would suit him very well. It was what he had tried to get gentlemen to do before. The roll was now called, and the following was the result:

Yeas—Drs. Griffith, Goddard, Taylor, Baxter, Ulrey, McCallum, Davis, A. M. Hunt.

Nay—Dr. Leslie.

This, Mr. Editor, was the end of the discussions.

The meeting, after attending to some small matters, adjourned to meet in Cincinnati next year.

I have sent you this report in order that it may have a wide circulation, and that the profession may know, through the pages of the Journal, what we are doing and saying out here in the west.

A. M. L.

ARTICLE V.

A Description of an Artificial Palate, Velum, Uvula, Septum of the Nose, Alveolar Process and Artificial Tooth. By JOSEPH LINDERER, Dentist, Berlin, Prussia.

IT sometimes happens, by a fault of nature, that the whole of the roof of the mouth is wanting; so, that eating and drinking are rendered very difficult, the cavity of the mouth and nostrils becoming one, part of the food and drink received into the mouth, comes out through the nose, speech becomes almost unintelligible. For this evil, surgery can do nothing. The resources of art alone, can afford relief. I will describe a case which came under my own treatment.

A young man about twenty years of age, who was found in the Orthopedic Institute of Health, by counsellor Berend, and sent to me by him, suffered from a congenital defect of this kind. There was a fissure in the upper lip, an opening in the middle of the alveolar border, of the form of a triangle, the base of which was towards the nose. This, from anterior to posterior, was a little more than four lines, and the lower part of the opening was four and half Paris lines in breadth. The height of the opening was four lines. The teeth which ought to have been in the jaw, were partly present and partly wanting. There were on the right side, first, the lateral incisor, which was of a conical form, then the cuspid, on the point of which, erosion was noticed, then again, the two bicuspids. The grinders were entirely destroyed by caries. On the left side stood, first, the cuspid, on the point of which, erosion was also observed, then, the two bicuspids. The grinders were wanting here too, having been destroyed by caries. There were thus wanting, in a space only four and a half lines broad, two central incisors and one lateral. Besides, what has already been stated, the alveolar border, which received the two cuspid teeth and the lateral incisor, was much shorter than it ought to have been, so that the front teeth in the lower jaw stood considerably in front of the anterior part of the upper dental arch, and there was

an opening in front when the molar teeth rested one upon another. The breadth of this opening was fourteen and a half lines and its height in the center, seven and a half lines. The lower incisors and cuspidati had suffered much from erosion. Back of the defect in the alveolar arch of the upper jaw, there was an opening in the arch of the palate, seven lines in breadth. The velum was also divided into two parts, each of which had at the end half of the uvula. These parts hung loosely. A palate suture could not have been used. It will be seen from this description that the cartilaginous septum of the nose was wanting. While a hole in the hard palate can always be repaired with safety, cases like the one here described, offer the most important difficulties, from the fact that the soft movable part must be imitated. The artificial appliance must be constructed in such a manner, that it may, as much as possible, make that part good. It is not possible, however, to do this perfectly, for the soft palate is not only drawn backward, but it also draws itself together. This latter seems to be of less importance.

The principal thing on which depends, then, is, that the movable part of the artificial palate, representing the velum and the uvula, first, should have the right, the accustomed position ; second, that it may be pressed upward, in the right way. Besides, the proper form must be given to it.

This last is difficult, because, in persons thus afflicted, that part, in its natural condition, is lacking, and hence, it is not easy to make a model which will correspond to the form ; besides, it is impossible to take an impression of the natural position of that part, for the reason, that it is not present. Of the movement made by the velum in swallowing, it is still less possible to take an impression. If the movable part has not the proper accustomed position, first, it cannot join itself closely to the remaining soft parts on the sides, and food or drink might come between. Speech will be rendered still more difficult, and deglutition also, because the back part of the cavity of the mouth is too low. Second, if it presses too hard on the remaining soft parts, it might excite inflammation, besides deglutition

will be rendered more difficult, if the back part of the cavity of the mouth is too high. If this artificial part has not the right size, and if it, or even the uvula alone, should hang too low, it may interfere with the tongue, in which case it will be likely to excite nausea and retching. If, on the other hand, it should be too short, food might get in on the upper surface. Food and drink might also get in above, if the artificial part does not fit closely to the movements of both the existing parts of the soft palate, and speech would suffer still more.

Thus we see that there are many things here to be considered. In order to remove, as far as possible, these difficulties, it is necessary, first, that we know exactly the form of the back part of the cavity of the mouth, when at rest; second, what are the movements of the soft parts during deglutition. The description of these would be too circumstantial, and still, perhaps, not adequate, and, therefore, it is best that one who wishes to make a compensating piece for that part, should most carefully observe it in motion and at rest, first in persons in whom it is perfect, and then in those in whom it is diseased or imperfect.

The Impression.—The first thing to be done, is to take an impression. This must be done with the greatest possible care, since, upon it depends, to a great extent, the result. But in the present instance, this is much more difficult than usual. I will, therefore, mention what is necessary thereto. The wax impression may be the same as that used in ordinary cases, for a palate plate appertaining to it is all that stands in the way. That about which we must be particularly careful is, that the wax-holder should be sufficiently long to embrace the tuberosity at each end of the alveolar border, in its whole length and height. In other respects, also, the wax-holder must fit before it is filled, and therefore it should be tried in before it is filled with the wax. It is especially necessary that it should be sufficiently broad at the back part, the outward edges not too high, and the inward wall having an oblique direction inwardly. The wax for the impression should be sufficient in quantity to fill the wax-holder to the proper height,

that a plate half an inch thick may be placed on the hindpart, and on the forepart of the palate—and that the diseased opening may still be filled to the height of half an inch. After the box has been inlaid with paper in the usual manner, it should be filled with wax, previously softened, sufficiently high that an impression of even a part of the hard palate may be taken. In the forepart, where the defect in the alveolar arch is, the wax must, of course, be much higher and indeed correspond in form. The impression of the alveolar arch must now be taken, using especial care that the tuberosity on each side shall make its impression perfectly. To this end, the wax which is forced backward must be pressed forward against the hindermost wall of the tuberosity with the forefinger of the right hand, whilst the inward free projecting wax must be firmly pressed against the palate, with the thumb of the same hand, and into the diseased opening as high as possible. We now take new wax in sufficient quantity, which should be at hand, and so soft that it may be pressed against the soft parts without troubling and without pressing them too far back. This may be put in the mouth all at once, or only a part at the time, between the wax-holder against the inner walls of which it must be firmly pressed, and against the wax already there, then against the remaining free part of the hard palate, and into the existing defective places, and last of all, against the soft parts, especially on the sides. This cannot be done with much force.

From this, three models of plaster of paris should be made. One for the procurement of two models for stamping palate plates, the second to work upon; the third will be needed if the second should be injured by being worked at. If the impression has been rightly taken, the soft part of the palate will have received the right form, except that it lies a little more above, but that is not a matter of any moment. The opening in the plaster model leading towards the nose, must, in the necessary manner, be filled with plaster, upon which the two metal models are to be made.

The palate plate for the hard palate, must be finished first,

and extend so far back that the posterior edge will cover the tuberosity. The missing part of the alveolar arch anteriorly, must also be covered. The fastening is effected in the usual way, to the remaining back teeth, by side braces and clasps. The missing part of the alveolar ridge is counterfeited by a piece of whale-bone, colored red, and a tooth fastened upon it. In the case in hand, only one tooth could be fastened upon it. An imitation of the dividing cartilage of the nose is easily made. The whole must be so constructed that the palate on being put in, shall not press the sides of the mouth, and gradually force the maxillary bones apart in front, as they are only united by the upper half of the alveolar arch, so that a steady, even, though feeble pressure, might cause this evil result.

The movable part of the palate is made in the following manner. 1st. The front edge is fit exactly upon the back edge of the hard palate. 2nd. From each end of the front edge there proceeds outwardly, a process covering each side of the tuberosity of the upper jaw, and, indeed, the whole upper surface. 3d. That part of the movable plate reaching backward from the tuberosity plates is much broader than the plate for the hard palate, indeed, so broad that the whole velum on its entire natural breadth is imitated. This breadth and the side plates must be present, because, in deglutition the soft parts draw themselves strongly together and upward; if now the artificial parts were not made in the manner mentioned, food and drink would force themselves into the nose on each side of the false palate. 4th. The under back edge forms two concavities, as they are seen in the natural condition, still, it is represented without the uvula. This plate is also stamped by means of the metallic model.

Now we make the regulating rod of the velum. This last can only have, when deglutition is not taking place, a particular position in the mouth, and must not sink too far down, on the other hand, it must not rise too high during the performance of this function. I managed this in the following way. Upon the middle of the upper surface of the hard palate, and two lines from the posterior edge, I soldered two staples

side by side. Between these came the regulating rod, which, at that place, is perforated and secured by means of a pin which passes through it and the staples and is riveted. The forepart of the rod is four lines long, and its end one and a third line from the plate, the back part is one inch long, round, and is run through a bar, soldered upon the middle of the upper surface of the velum, four and a half lines from the front edge. By this means, the artificial velum is prevented from sinking deeper in the mouth than it should. But, if in deglutition it should be pressed up too much, then the hinder part of the rod will lift itself up while the forepart will sink. But since this can only be done to the extent of one and a third lines, the velum, also can only be pressed so far, because the regulating rod stops it.

The securing of the parts of the plate, as also the motions of the velum, is effected by a gum-plate.

But since the uvula of a soft part must be of gum, and the edges of the velum be soft, we must, therefore, have a velum with the uvula, made of gum large enough to come forward and cover the hard artificial palate, to the breadth of one line, and reach out a little beyond the edge of the curtain.

The fastening of this gum-plate upon the metallic plates must be done with silk thread, by means of sewing. For this purpose a number of very small holes must be made through the back edge of the hard palate, and through the front edge and the other edges of the palate-veil, all, one half line from the end. The front edge of the gum-covering must first be sewed to the back edge of the hard palate, indeed, of the surface of the mouth. Then the metallic covering must be brought into the proper position to the artificial hard-palate, and first, the front edge must be sewed to the gum-plate and then the other edges, which done, the artificial palate is completed.

Since by the strong and frequent movements of the artificial palate, the front edge of the gum-plate, when it is sewed on, might be easily torn out, in which case the palate would be useless, it becomes necessary, before sewing it on, to bind the edge of it with a band of gum, which is very durable. In order that the silk employed may not too easily suffer from the saliva, it

ought to be smeared with dissolved gum. We must take especial care not to have the uvula too long.

The result of this contrivance of mine in respect to eating and drinking was excellent. The patient felt not the slightest inconvenience, deglutition took place without trouble and after meals, no traces of food were to be seen on the nasal surface of the palate. Health counsellor, Berend, presented this young man to the National Society of Physicians, in whose presence he ate and drank. In regard to specch, the machine had produced no important change; in the mean time, it must be noticed, that I could only observe the patient on that particular day on which he received the palate, for on the next day he left Berlin, and, indeed, it is often the case with inserted teeth, that the speech, which at first is somewhat injured, afterwards becomes perfectly good. But if this should not result from the artificial palate, still we might remedy this defect by art, perhaps by some alteration of the machine, but at least by giving the patient instruction in regard to speech, for it is natural, that the organs which are necessary for speech, and which have been moving in this imperfect manner for so many years, should be obliged to unlearn this, and that it is possible we may well suppose.

ARTICLE VI.

Mr. Gilbert and his Perpendicular Extraction.

MESSRS. EDITORS:

Gentlemen—Being in London during the last month, I took an early opportunity of calling on Mr. Gilbert, surgeon dentist, of Suffolk street, for the purpose of requesting permission to examine his invention for the extraction of teeth; I have to acknowledge myself indebted to his courtesy for the trouble he took to explain to me the construction of his instrument, with his method of using it in various cases.

At first sight, I was impressed with the very ingenious nature of the invention, and subsequent consideration has left that impression uneffaced; but, that its advantage renders it pre-eminently superior to all other modes of operating, I am disposed to doubt.

A perusal of Mr. Gilbert's work will clearly convince the reader that the professed object of the fulcrum apparatus is to allow of the tooth being removed in a direction perpendicular to the axis; Mr. Gilbert's words are sufficiently definite, when he states his perfect concurrence in the expressed opinion of John Hunter, that "it would be best to attempt the extraction of the tooth in a direction perpendicular to its axis, and not by means of the *lateral* motion required by the forceps," and further goes on to remark that he succeeded at last in attaining the object sought by the invention of an apparatus which should afford a fulcrum external to the mouth—his success is attested by testimonials both from patients, who have placed themselves under his care, and from several scientific men who have inspected or used the instrument. The elevation of the tooth by *one movement* only, is more than once asserted; the escape from the "painful wriggle of the forceps," in the ordinary method of extraction, is triumphantly set forth; and as a climax, in the last communication, a patient, after enlarging on the peculiar difficulties of the case, asserts, (and which, by the by, are in italics) that the tooth was removed "without any bleeding whatever;" had the testimonial containing this passage not been appended to a scientific work, it would have been passed unnoticed by me; but, the extraction of a molar, firmly fixed and affording little substance for the grasp of the forceps, ("without any bleeding whatever,") is a feat partaking so much of the marvellous, we are led to regret that the circumstance was not made the subject of special comment.

It is most probable, sir, you would not have been troubled with this communication had not the interest I take in matters connected with odontology, led me to inspect the invention for myself, and after the very excellent description with which Mr. Gilbert favored me, I am enabled to assert that the end for

which he constructed the apparatus is yet unattained. In the first place, the fulcrum is not external to the mouth, because it is allowed to rest on the incisor teeth. Mr. Gilbert assured me the pressure was slight and gave rise to no ill-effects, but any amount of pressure must be objectionable; the indentation in the material covering the fulcrum show that pressure *does exist.* Secondly, the "painful wriggle of the forceps," is still required; in other words, Mr. Gilbert employs the *alternate lateral motion;* for the purpose, as he explained, of detaching the tooth from its connection with the socket, (referring to Robinson,) I find his directions for the application of the forceps comprise the same words—the only difference in the two operators, as far as I can discern, consists in one trusting to his wrist to detach and elevate the tooth, while the other, by the employment of a fulcrum, converts his forceps into a lever for the same purpose, the alternate movements being used by either. Lastly, if the key is ever requisite under any circumstances, Mr. Gilbert's invention cannot supply its place. Robinson limits its application to those cases where one side of the tooth is so far removed as to leave no substance for the grasp of the forceps—as Mr. Gilbert uses this instrument, of course he can only operate in those instances where sufficient substance is left for him to grasp, as the use of a fulcrum certainly does not remove the necessity of securing the member firmly prior to attempting its extraction.

I forbear to trespass further on your attention, save to repeat my conviction that, although Mr. Gilbert deserves all credit for the ingenuity he has evinced in his laudable endeavors to alleviate human suffering, he has not gained the object he intended—that whether John Hunter be right or wrong, the fulcrum apparatus does not go far to strengthen his position.

GEORGE BROWN.

Lectr. Vety. Medl. Royal Agrictr. College, Cireucester.

J nuary, 1851.

ARTICLE VII.

Report of Two Cases—one of Alveolar Abscess, and the other of Injury of the Inferior Maxillary. By Charles Bew, Surgeon Dentist to His late Majesty William the Fourth.

Case First. Soon after my residence in Brook street, London, a young man, one of the messengers of the Lord Chamberlain's office, had been for some time suffering from the weeping of a formidable abscess, beneath the angle of the left side of the under jaw, which discharged pus of a viscid and fetid character as copiously as uncomfortably. The young man called on me, with a note from the surgeon of the household, which stated the young man's ailment to arise from a portion of a diseased dens sapientiæ in the left under jaw. On examining the patient, I found him pale, much reduced, and altogether a prey to misery of no ordinary degree, and much apprehension, having been told that unless the diseased tooth could be extracted, his life would be placed in peril through accession of fever. I comforted and encouraged the poor sufferer, all in my power, and commenced my examination. The crown of the tooth had disappeared, whether by disease or fracture, he could not recollect, but said he thought it had been taken out in consequence of aching, that is, the cap broke off and the root left in the alveolus. The stump or remaining portion of the root, I could but very indistinctly see from the swollen state of the gum on the coronoid process, obscured as it was by a molar tooth. But I could pass the nail of my thumb and right index finger all around the stump, which encouraged me to hope I should be able to fix a peculiarly shaped lever key, bent into the form of the letter S, to it, and by which, while my hand was high above the associated side teeth, I found I could get a firm low hold on the stump itself. I first moved, and then raised it upwards in a small degree, perceptible by the discharge of black clotted venous blood which followed; but as this was

effected with considerable pain to the patient and fatigue to myself, the mouth was rinsed with warm water as long as the blood continued to flow, when I saturated some lint with a warm spiritous tincture, which left him at comparative ease. I made an appointment with him for the next morning, my first attempt having been made in the afternoon, being well aware that the ordinary contraction of the alveolus on the conical root, would be sufficient to raise it enough by morning to enable me to extract it with certainty. The secretion of pus during the night on the conical root made it feel as though it had been soaped, and when out, it was difficult to secure it between the thumb and finger. The removal of the painful cause, produced the desired effect. My patient was at ease and a stop put to the inflammatory action which had been going on so long, with its concomitant formation of the pus or acrid matter. This having no other way of escape, made for itself a passage through the socket and jaw-bone, discharging itself on his shirt collar, and a pledget of lint placed under his chin and secured by means of a silk handkerchief tied over his head. The abscess disappeared in a week, and he was soon restored to sound health.

Case Second. D. W. Keoghan, formerly one of the carters to Barclay's distillery, South Lambreth, on my taking possession of the house I now reside in, a man who looks after a Protestant Chapel, of which my landlord is the curate, had been recommended to see the putting in of my furniture, and in the course of his attendance, requested me to look at, and give my opinion upon the sad state of his teeth and mouth. I found his mouth in a dreadful state of inflammation, with exfoliation of the under jaw, and the four incisors ready to drop out. I observed to him, that he appeared to have had a very serious accident, and may I ask how it happened? One day in descending from the cart, some one called to him while in the act of jumping from it, and by diverting his attention, his under jaw caught against the tail-board, he was stunned and fell insensible in the road in which the cart was standing. He was confined to his bed six weeks, and when he was able to come out to his work, his suffering was scarcely supportable. On my

first seeing him, he asked if it were possible to have a cure effected? I encouraged him to believe that, with care and attention, he might be restored, and that as soon as I was settled, I would attend to his case, which I accordingly did.

The four incisors were so loose, that they were moved by every touch of the tongue, and more than half of the under jaw was in a frightful state of exfoliation. Two abscesses were discharging large quantities of purulent matter, which, together with the constitutional effects of the local irritation, and the difficulty he experienced in taking food, threatened to run the poor sufferer very soon into his grave. Under these circumstances, the four incisors were first removed, and then commenced the work of taking away the exfoliating bone. This operation was long and tedious. Five pieces, as black as ebony, were in as many weeks taken away, relieving the poor man of pain and fetor almost unbearable. This accomplished, the parts healed rapidly, and by the kindness of one of my mechanical friends, the incisors were neatly placed in a metallic *Ratelier* and so fitted to the mouth, that no sign is at present discernible, either of his sufferings or disfigurement. He takes his food without difficulty, and is in better health than he has been for years.

15 South Lambreth, near the Vauxhall Bridge, Railway Station.
October 16, 1851.

ARTICLE VIII.

The Alloys of Gold for Dental Purposes. By James Robinson, Surgeon Dentist to the Royal Free Hospital, &c.

The public is much indebted to the *Lancet* for the series of papers published under the title of the Analytical Sanitary Commission, which prove by the aid of the microscope and chemical analysis that the common necessaries of life are largely

adulterated—in some cases with cheaper articles of an innoxious character, but in others with substances absolutely of a poisonous nature. The latter are undoubtedly among the predisposing and exciting causes of disease, and often induce symptoms of a peculiar and anomalous character. The recognition of adulterations, therefore, falls within the immediate province of the medical press, considered as the guardian of the public health.

Among the adulterations we must rank the employment of alloys containing the baser metals in large proportions for dental purposes, the placing these alloys where they are exposed to the action of the secretions of the mouth and stomach, and atmospheric air, conditions most favorable for the oxydation and corrosion of the metals and the formation of salts, which being conveyed to the stomach with the saliva, exert an injurious influence on the health of the individual. In order to elucidate the corrosive action which takes place upon the alloys used as plates for artificial teeth, it is neeessary to say a few words on the natural and diseased conditions of the saliva and fluids of the stomach by which this action is excited.

The food in the act of chewing is mixed with the saliva, which being a viscid fluid, entangles a quantity of bubbles of atmospheric air, which are carried with it into the stomach. The saliva in its natural condition as it escapes from the ducts of the salivary glands is, a viscid, colorless, tasteless, and inodorous fluid, not quite transparent, and generally alkaline; but occasionally neutral. Healthy saliva like other animal fluids, varies in its amount of solid constituents, but usually contains about 12 parts of solid matter in 1,000 parts of the fluid in adults. This consists of a peculiar salivary matter called ptyalin, a fatty acid albumen, mucus, chlorides of potassium and sodium, soda, either free or in combination with albumen, lactates of potass and soda, phosphate and sulphate of soda, sulphocyanide of potassium, and the phosphates of lime, magnesia, and peroxyde of iron. This pure saliva is mixed in the mouth with the mucus secreted by its lining membrane, which renders the fluid more viscid. The researches of Dr. Wright

show that saliva is capable of absorbing oxygen from the air in variable quantity, which sometimes exceeds, at others, falls short of half the bulk of the fluid ; but it also contains from one-eighth to one-twelfth of its volume of carbonic acid. The absorbed oxygen probably aids in the process of oxygenation. At least, Dr. Wright found that saliva remaining for some hours in a vessel filled with oxygen gas, was capable of converting a much larger quantity of starch into gum and sugar than an equal quantity of fresh saliva.

It is probable that healthy saliva judging from its composition and alkaline reaction, would exert very little if any action on the alloys employed in dentistry ; but the case is entirely altered when the saliva is in an unhealthy condition, and from being alkaline becomes acid. The alkaline character of healthy saliva is readily shown by placing a slip of reddened litmus paper on the tongue when the color is changed to blue ; but when this fluid becomes acid, blue litmus paper is reddened by contact with it. Donné states, that the saliva is acid in all cases of inflammation and irritation of the stomach ; in many cases of acute inflammation, such as pleurisy, inflammations of the brain, ague, rheumatic fever, and sometimes in mercurial salivation ; in fevers of a typhoid and inflammatory type, in measles previously to the eruption, and in miliary fever in which the saliva is said to be so acid as to cause a sensation of roughness of the teeth. To these might be added a long list of affections, accompanied by derangements of the digestive apparatus, in which acid saliva is secreted.

Donné states, that although he has never met with a single instance in which the saliva was acid, where the functions of the stomach were healthfully performed, nevertheless, some writers assert, and with truth, that acidity of the saliva does not invariably accompany derangement of the stomach, such as indigestion, especially when accompanied by, or dependent on, affections of the gastric nerves, in cases where the tongue is pale, flabby, tremulous and furred, with a bitter flavor in the mouth. In these cases the saliva is rarely acid, more frequently neutral,

and often alkaline. The acidity of the saliva may depend on the presence of free lactic, acetic, muriatic, oxalic, or perhaps uric acid, but most frequently lactic acid. These acids, with the exception of the oxalic and uric, are present in healthy saliva, in combination with soda and potass; but when the bases are in insufficient quantity to saturate the acids, they of course will exist in a free state and give rise to acid reaction. Lactic acid appears to be in excess in the saliva of persons subject to gout, rheumatism, ague, diabetes, and in inflammatory conditions of the stomach and bowels; acetic acid in aphtha, scrofula, scurvy, small-pox, and protracted indigestion; also after the use of ascescent wines; accompanied by muriatic acid in simple gastric derangements from immoderate use of animal or vegetable indigestible food; but in these cases it is by no means improbable that the muriatic acid is derived from acid eructations from the stomach. Uric acid is said to have been found in the saliva of persons subject to gouty affections. Oxalic acid has been discovered in the saliva of those who are in the habit of eating large quantities of sorrel, (which contains oxalic acid,) or have taken large doses of liquor potassa. It is thought by some that free phosphoric acid will sometimes be discovered in it. Acidity of the saliva may be produced either by general or local causes. The acids may be secreted by the salivary fluids, either from direct depravation of function, or sympathetic with gastric disturbance; or again, acid may be excreted by these organs. Dr. Wright observes, that medicines and other substances taken internally, sometimes escape by the salivary glands, and in so doing impart to that secretion the properties they usually possess; that when minerals are absorbed into the system they usually escape from the body by the kidneys or skin, but sometimes they are discharged by the salivary apparatus, and mingling with the saliva, impart to it a stimulating and even an acrimonious quality; and he has known considerable local irritation to be produced by saline matter in the saliva, especially chloride of sodium, nitrate of potass, and iodide of potassium.

The saliva sometimes contains an excess of alkali which

renders it acrid. Dr. Wright states, that in most of these cases, the natural alkali of the saliva is in excess; and that alcoholic liquids, aromatic, and other similar substances, are apt to escape from the system by the salivary glands, and in so doing, impart various degrees of acridity and offensiveness to the secretion. Morbid conditions of the saliva are not the only causes of decay of the teeth, and the corrosion of metallic alloys employed either for stopping them, or as plates for artificial teeth. Various articles of food retained between the teeth, or in the hollows, or in contact with the metallic plate or stoppings, such as vinegar and sugar, which by subsequent changes become acid, act with greater or less energy on the teeth. Again, the fluids which so commonly regurgitate from the stomach as acid eructations in dyspepsia and other gastric derangements, containing, as they do, a considerable portion of muriatic acid, corrode the teeth, as is evinced by the sensation of roughness so commonly felt in these cases.

From the preceding observations it is evident that, owing to the frequent changes of the saliva and gastric fluids, such substances should be selected for fixing artificial or stopping carious teeth, as cannot be acted on by the free acids or alkalies contained in these secretions. We must, therefore, direct our attention to the action of these agents on spurious alloys used for fixing artificial teeth, and the numerous amalgams, cements, enamels, &c., employed for stopping carious teeth. There is no department of the dental profession that has afforded so extensive a scope for quackery, imposition, and extortion, as that of supplying artificial and stopping carious teeth, while on no other department has so much ingenuity and mental labor been bestowed by the scientific dentist as on that of bringing these branches of his profession to perfection. Yet in none, perhaps, has the public, generally speaking, been more disappointed, in consequence of the extravagant and absurd pretensions of cheap advertisers, who profess to replenish the mouth with artificial masticators, and repair the dilapidation of carious teeth, with their poisonous compounds, as easily as a person could be furnished with a ready-made coat. Judging from the paragraphs in the

newspapers and periodicals, it would seem that the public have been grossly deceived in trusting to those cheap advertisers as skillful and scientific practitioners, who use pure materials, innoxious to the health. Complaints of this nature are by no means new to respectable practitioners, most of whom could furnish scores of cases to substantiate their truth, while the records of police and county courts, when the dupes have had the moral courage to resist the imposition, will furnish ample testimony to the extortionate demands of these *soi-disant* cheap dentists. The letters and paragraphs which have appeared in the newspapers in reference to the inferior gold used by dentists, and its injurious effects, will, we doubt not, be productive of immense good to respectable practitioners; it will, however, be the means of directing public attention to a subject that seriously affects the general health, and personal appearance, of a considerable portion of the community; it will show how absurd are the pretensions, and how inferior must be the artistic skill, and how bad the materials of an artificial tooth fixed on gold, "*for five shillings*," which cannot be supplied by a conscientious or respectable practitioner, at a less cost than a guinea or upwards. There can be no question that either the person holding out the five shilling tariff, must use inferior materials and less skill, or the charges of the other must be an exorbitant imposition.

The time has now arrived for an explanation of these discrepancies in dentist's charges, since it would appear that the public has paid too dear a price for cheap dental operations at the expense of permanent local and constitutional disease, arising from the deleterious effects of bad adaptations and of those inferior metallic alloys, which suffer corrosion when in contact with the fluids of the mouth, and generate poisonous compounds.

It has been suggested, as a guarantee to the public of the purity of the gold used by dentists, that each article should be stamped at Goldsmith's Hall. To this proposition, a respectable practitioner can have no possible objection; but the application of the stamp is attended with insuperable difficulties.

To entitled the practitioner to the Company's mark, he must be licensed to sell gold, the punches must be registered at the Hall; and moreover, it is a rule with this City Company, never to stamp manufactured goods of any kind. The article must present the general form intended, with the springs, wire and rivets attached; the finishing, polishing, and fixing the teeth, may be done afterwards; but considerable force is necessary in stamping the work, by which such serious injury is done to the fitting of the plate, so that in all cases it would be necessary to re-model the frame work or basis.

The most simple, effective, and economical guarantee to the public would be, that every piece of work in gold should bear the *name* of the dental practitioner, and should any question arise regarding the purity of the material, the patient would only need to send it to the Assay Office, in Hatton Garden, for examination, with the results of which he would be furnished in two days, at a merely nominal cost, and without the least injury or deterioration of the artificial dental apparatus.

Having indicated a remedy for the evils that at present exist, we will proceed with our inquiries relative to the various metals used for forming the frame-work or basis of artificial, and the stopping carious teeth, with the substitution of one metal for another in cheap dentistry, and endeavor to ascertain to what extent the acids and alkalies of the saliva are likely to act, or enter into combination with, these metals or alloys, and form compounds which affect the health of the patient constitutionally and locally. The acids, as we have before stated above, existing in natural or diseased saliva, are the lactic, acetic, muriatic, and very rarely the oxalic and uric acids; the alkalies are potass and soda, chiefly the latter. The metals employed in the manufacture of the plates, wires, rivets and springs, upon which artificial teeth are mounted, are gold, platinum, palladium, silver and copper, either alone or alloyed in various proportions. Gold, from its incapability of being attacked by other agents than chlorine, undergoes no change or corrosive action from the constituents of the saliva; platinum, when pure, like gold, undergoes no change; palladium, a metal

associated with platinum in its ores, likewise remains unacted on by the salivary fluids. It is not acted on by sulphuric or muriatic acids, but is oxydized and dissolved by nitric acid, and blackened by the hydro-sulphuret of ammonia. Pure silver resists the action of the acids and alkalines of the saliva, but its affinity for sulphur is so strong as to cause it to tarnish rapidly by contact with white of egg, or even exposure to the atmosphere, especially where coal fires are used. Pure copper is used only as an alloy with other metals for dental purposes, of which I shall treat more at large hereafter. It has a strong affinity for oxygen, and is gradually oxydized by exposure to to the air and salivary fluids, especially such as contain fatty matters; and is converted into a carbonate, which forms a greenish incrustation on the surface of the copper, and is readily dissolved by weak acids. Such is the chemical action of the acids contained in the saliva on the *pure* metals.

We now turn to the results of a similar action on the metallic alloys employed by dentists, in order to ascertain to what extent the acids of the saliva act upon them, and form deleterious salts. Alloys are, for the most part, more fusible than the pure metals of which they are composed. The metals, as a general rule, unite with each other in all proportions by fusion, but their mixture impairs the qualities of ductibility and malleability; but this, to a great extent, depends on the nature of the metals. The addition, for example, of one grain of lead to 2,000 grains of gold, diminishes its malleability to a surprising extent, but increases its hardness, so that in certain proportions the alloy of gold and lead is harder than that of gold and copper. The metals which are most destructive to malleability and ductility, are lead, antimony, arsenic and bismuth; a small proportion of copper deepens the color of gold and increases its hardness; a similar proportion of silver renders it more pale, but the alloy is harder than either of the pure metals. For the purpose of rendering gold harder and more capable of resisting wear and tear, a certain proportion of copper is legally added to the coinage. The tendency of many metals to combine with oxygen is increased when alloyed; but the re-

verse occurs with others. The action of acids on alloys, is modified by the properties and proportions of the respective metals. Gold alloyed with a very small proportion of silver, defends the latter from the action of nitric acid; but when, as in the operation of quartation, the silver predominates, the whole of the latter is dissolved out by the acid, leaving the gold pure. Pure gold is never employed for the beds of artificial teeth, because it is so soft and flexible that it would very soon lose its shape, and thus become absolutely useless. The pure metal is only employed in the form of gold leaf for filling the cavities of carious teeth.

The standard gold for English coins contains about one-twelfth of its weight of copper, or copper and silver; the hardness is increased by this admixture, without materially detracting from its malleability and ductility. The alloy with silver is tougher than that with copper. If the gold used by dentists was alloyed in the same proportion as that of our coinage, it would be too soft for its intended purposes, and would soon lose its shape; still more so if alloyed with silver, independently of the color being paler than that associated with gold in the public mind. The gold employed by respectable practitioners for making plates, is never less than 18 carats pure, but more frequently nearly 19; which means that 24 parts of the alloy contain 18 parts of pure gold, with 6 of silver or copper. Platinum is not much used for plates, owing probably to the difficulty of procuring it pure, and to its color. Palladium is not often employed on account of its color, and the action of sulphur, which tinges its surface dark brown. Silver *never* ought to be employed, either alone or alloyed with copper, but only as we have already noticed for alloying gold. The standard silver for coinage consists of 13 parts of silver to 1 of copper; but much more copper may be added without affecting its color. The copper is added to the standard for the same purpose as silver and copper to gold, that is, to increase its hardness, pure silver being too soft for this purpose. Silver becomes rapidly tarnished in the mouth, chiefly by the action of sulphur, which covers it with a

brownish black crust. The sulphuret of silver thus produced possesses no dangerous or hurtful properties.

Copper, as we before observed, is only used for the purpose of alloying gold and silver, but if used in excess in either of the alloys, especially in the alloy with silver, it is powerfully acted on by the fluids of the mouth in the manner already described, forming absolutely poisonous compounds.

In order to test the relative effects of strong acids on the alloys of gold employed for plates for artificial teeth, the following experiments were made. The acid consisted of two parts of commercial nitric acid with one part of water. 24.47 grains of gold 14 carats fine, alloyed with silver, lost 1.15 grains by the action of the acid. 24.47 grains of gold 14 carats fine, alloyed with copper and silver, lost 8.42 grains. 24.97 grains of gold 14 carats fine, alloyed with copper alone, lost 4.77 grains.

These results are of great interest, because they show first, that gold alloyed with one metal, whether it be silver or copper, is less liable to corrosive action than an alloy which consists of the *three* metals, gold, silver and copper; secondly, that the alloy with silver alone resists the action better than that with copper alone.

The preceding observations demonstrate that no other metals or alloys than those of gold and platinum can be placed in the mouth without the liability to chemical changes, which either render the workmanship unsightly by changing its color, or yield noxious compounds from corrosion; and for these reasons no dental practitioner is justified in employing others than those named above.

Having determined the nature of the metals and alloys, our attention is next directed to still lower alloys, or combinations of metals in various proportions, used as solders, by which the rivets and springs are attached to the plates. These should approximate very closely to the standard alloy used as the basis for the plate itself; because when of a much lower standard, galvanic action is excited, and the more easily oxydizable metal is more rapidly acted on than in its pure state by the contact of the less easily oxydizable metal with the fluids of the mouth.

The alloy used as solder for fixing the rivets to the plate of 18 carats standard, should consist of 15 parts of fine gold, 4 of silver, and 4 of copper. This solder can only be used for gold of 18 carats, platinum or palladium, as any inferior alloy would be fused with the solder. This solder is not acted on by the acids or salts of the saliva. Silver solder is generally composed of silver and brass. This is more readily acted on by the fluids of the mouth than standard silver itself. The solder should in all cases assimilate in quality to the standard of the plate, for any great reduction would as a matter of course render the solder more liable to be acted on by the salivary fluids, and thus nothing would be gained in a sanitary point of view, by having only a part of the work of the proper standard, while the remainder had no higher value than eight or ten carats. The use of inferior solder affords ample means for chicanery and imposition in cheap mechanical dentistry and inferior artistic skill; the practice generally being to fabricate an extremely *thin* plate of the proper standard gold; the springs, wires, rivets, &c., averaging from 12 to 15 carats, and the solder employed for attaching them to the plate scarcely more than from 10 to 12 carats; or in round numbers, the whole piece of workmanship consisting of equal weights of pure gold and the baser metals. Were such a piece of dental manufacture submitted to the assay office, it would be discovered that the whole piece would not average more than from 12 to 14 carats, although the major part of the apparatus in appearance (the thin plate) bears the mark of respectability, and may probably approximate to the legal standard. It may be asked, why use an improper solder when the plate is of the proper standard? The answer is easy: the more gold is alloyed, the more easily does it fuse; and, therefore, if the highest quality of solder corresponding to the 18 carat plate is to be employed, the plate should be proportionately thick; and the springs, rivets, &c., of a higher standard, or the latter would fuse into a mass during the process of soldering, particularly where a large quantity of solder is used. The solder No. 1, used for the 18 carat standard plate, is rather more than 15 carats fine; No. 2 is about 13¼ carats, and No. 3 rather more than 12 carats, fine.

Hitherto we have spoken of work bearing the appearance of respectability, although really very inferior. We shall now refer to the various substitutions and adulterations daily inserted into the mouths of patients, some of which are scarcely superior to pinchback or gilded copper, with the single exception, that for conscience sake they do contain a portion of gold. Pieces of work are frequently brought under our notice, in which the fittings of the teeth to the plate have not been properly made—a most important part of the work, absolutely essential to the comfort in wearing, and durability of the work—in which common pewter solder had been made to play the part of the mechanic in filling up the interstices, and fastening the springs and rivets. The substitution of one metal for another is very common in cheap dental work, and standard silver appears to be the favorite substitute. The plate is fashioned some way or some how; clasps, wires, rivets, &c., are attached with the *easiest* running solder—no matter what; either inferior silver or pewter, or both—the teeth fastened with sulphur, and then comes the climax and godsend to fraud and imposition—a coating of pure gold by the electrotype process, after which it is ready for insertion into the mouth. It is then forced some how or any how into its intended position, without any regard to carious or tender teeth, or the remains of diseased or irritating stumps; and in total ignorance the patient wears this spurious imitation—a compound of silver, sulphur, copper and verdigris—until local inflammation of the mucous membrane of the mouth, diseased gums, aphthous ulcers, accompanied by fetid breath, gastric and nervous derangement, discover to the wearer the old adage, that "all is not gold that glitters." Palladium, either alone or alloyed with silver, is acted on by the sulphur of the salivary fluids and food, and becomes blackened thereby; but the same remedy is applied by the cheap dentist, and a plate of this alloy is covered with a thin coating of gold by the aid of the galvanic battery, which, like charity, covers a multitude of dentists' sins.

Having explained above what *can be* and what *is* done in the way of sophistication and substitution of metals, I purpose mak-

ing a few comments on the proper method of manufacturing a set of artificial teeth, and showing how far the actual cost of the raw material can coincide with the professed cheapness put forward, in which sets of teeth, "upon superfine gold," are offered at prices varying from £3 to £10, *finished* in the best style, and warranted to fit, or the money returned!!! Gold has been from time immemorial the admired and worshipped of man, from the golden image of Nebuchadnezzar down to the modern pieces bearing the portrait of our gracious queen; and the *auri sacra fames* has tempted statesmen, poets, nobles and philosophers to resort too frequently to mean and dishonorable arts for its acquisition. Gold holds its potent sway over the present generation as the key and stepping stone of ambition, and the food by which avarice and cupidity are nurtured. Chicanery and imposition are resorted to for its possession and its distribution, all being desirous of possessing this metal, either in their pockets or on their person, as jewelry, or in their mouths at the cheapest possible rate; and whether what they obtain be gold, or its imitations, the majority are satisfied with whatever wears its semblance, although when too late they sometimes discover that even *gold* may be bought too dearly.

The plates for a set or partial set of artificial teeth, should not only be of the proper standard, but of *sufficient substance and breadth to ensure strength and solidity* to the frame-work, when in use; and the solder employed in the fabrication, should, as I have before observed, assimilate in quality to the quality of the plate; the less solder used the better. These essentials in reference to the quantity and quality of the materials, involves a matter of importance in relation to the cost of the raw material—gold. It is well known, that the average price of standard gold is £3 15*s*. per oz., and any respectable practitioner will use for a full or a partial set, from an ounce to an ounce and three quarters, or even more of this metal, so that the gold itself, will, on the average, cost from £5 to £7; this it must be remembered, is independently of modeling, teeth, springs and fittings in the process of manufacture, to say nothing of artistic skill, finish and adjustment to the mouth, which

plays an important part towards the ultimate success, ease, comfort, appearance and durability. Notwithstanding these facts, we have it daily announced by advertisements, handbills and placards, that whole sets of teeth can be furnished from £3 to £10, each person warranting his wares to be mounted on *pure, superfine and standard* gold, *with the highest mechanical finish and artistic skill*—his gold unalloyed, and himself the veritable Simon Pure. There can be only one answer to these impudent assertions, with reference to the quality and solidity of the materials employed. The cheap dental conjurer, if he does use pure materials, must have discovered the philosopher's stone, and be a transmuter of the baser metals, or he must have a California in his kitchen, or be a large shareholder in the Cornish copper mines, as well as an adept in electro-metallurgy. Much has been said and written in reference to the application of the Hall mark to the gold used by dentists; I have already shown that this mark would be of little value as a guarantee of the purity of the metals, unless, in an unmanufactured state; again, the silver mark may be substituted. The gold mark, or a private mark resembling that used for stamping German silver, *might* be employed, and the work covered with gold by the electro-type process, only those acquainted with the genuine London Hall marks would be able to detect the imposition, as the spurious might so closely resemble the genuine mark, as to deceive very good judges, unless compared with the latter. There are several other towns who have their halls or companies for stamping the precious metals, as Birmingham, Edinburgh, &c.

Jewelers and pawnbrokers frequently test the quality of gold without assaying it, by providing a number of points of gold, of different degrees of fineness, from the standard downwards, which are rubbed on a touchstone, and the streak compared with that produced by the article under trial. Nitric acid is also applied, and the quality of the gold judged of, by the amount of action on it by the acid. But I am of opinion, that the most certain test would be, as I have before advised, to send the suspected article to the Assay Office.

The metals employed for the plates, &c., for artificial teeth being disposed of, I shall conclude with some observations on the amalgams, and other compounds used for stopping decayed teeth.

There is quite as much, if not more, injury produced by the introduction of these substances into the mouth, as, with a few exceptions, they contain mercury in various proportions with other metals. Mercury with silver, forms a greyish white amalgam, soft, when first made, but becoming gradually hard in the mouth. This amalgam is readily acted on by the fluids of the mouth, and forms deleterious compounds, which act most injuriously on the alveolar membranes, gums and other parts of the mouth. Several cases are recorded, in which profuse salivation followed its use; and in other cases, where large cavities are thus filled, the patient becomes liable to pain, accompanied by a coppery taste in the mouth, especially, when any derangement of the stomach occurs. The chemical action on the amalgam is rendered more active by the galvanic circle produced by the contact of the two metals and the fluids of the mouth. This amalgam is advertised under the various names of mineral cement, mineral succedaneum, white enamel cement, new discovery, &c.: all are the same under different names. They are all composed of silver filings, or precipitated silver with zinc, made into paste with mercury.

Another compound employed for this purpose is fusible metal, composed of bismuth, lead and tin. It is applied by melting it over a candle or spirit lamp, and is inserted into the tooth before it solidifies. The temperature required to melt this alloy, is that of boiling water, and this would suffice to produce inflammation of the tooth; but the metal contracts on cooling, and no longer filling the cavity of the tooth, admits the fluids of the mouth into the cavity, and exposes the whole surface of the metal to oxydation.

Lead, which is occasionally used, is readily acted on by the fluids of the mouth, and generates poisonous compounds. Silver leaf becomes quickly blackened, but the compounds of pure silver produced are innocuos. Melted sulphur is also used, but is liable to the same objections as fusible metal. Pure pla-

tinum might be used safely, but it is so much less ductile and malleable than gold, and its price so high that it can seldom, if ever, be employed with advantage. Pure tin, also, undergoes little change in the mouth; its compounds are innocuous, and may be employed with safety.

Vegetable cements are chiefly composed of solutions of gums, or gum resins, dissolved in spirit of wine. A compound of gutta percha has been introduced by Mr. Hill, an American dentist, which answers extremely well, and is wholly unacted on by the salivary fluids; but its color, a light brown, renders it objectionable for stopping front teeth. It is more available as a temporary stopping for sensitive teeth, until they are in a condition to bear stopping with gold.

Pure gold leaf is, however, the best and only material that ought to be employed for this purpose. Its toughness and durability, the ease with which it can be packed into the carious tooth, and its total resistance to the chemical action either of the saliva or food, mark it as especially fitted for stopping teeth.

We have thrown these remarks together, as much for the benefit and instruction of the public, and for their guidance in the choice of operators and materials, as for the information of our respectable professional brethren, at home and abroad; many of whom are unaware of the extent to which the substitution of inferior and deleterious materials is carried, to the detriment of the dental art in the eyes of the world.

To the public, who have been lately enlightened to some extent, by the publication in the newspapers of cases, in which serious injury, local and constitutional, has been inflicted on individuals, together with gross fraud upon their pockets, we commend the attentive perusal of the plain and impartial detail we have put before them, of the illegitimate practices resorted to by quacks and pretenders, and the proper and legitimate process, by which the skillful and intelligent dental practitioner, can hope successfully to supply the defects of age, accident, disease, or malformation. To those who have been already sufferers from the arts and tricks of the unscrupulous and dishonest—to those

who have already been in the hands of the Philistines, we need scarcely impress the fact, that the best advice and the best materials, the best workmanship and the guarantee of a respectable practitioner, will, in the long run, be found the true economy. Upon those who are yet deliberating as to their first choice of dental assistance, we would strongly urge the advisibility of eschewing all who announce to the world miracles of art, or miracles of cheapness, and who hold forth the accomplishment of the impossible and impracticable, as baits to entrap the ignorant and unwary. We feel satisfied, that in the foregoing statements we have advanced nothing but what is true, and nothing that can give offence to the skillful and educated practitioner; while to those who have no claims to either, we need offer no apology for the exposure of unfounded pretensions and professional deception. We have no sinister or selfish objects in view, and if our statements shall have had the effect of enlightening the public mind upon a very important department of surgical and mechanical science, we shall feel ourselves amply rewarded.

ARTICLE IX.

Letter from PROFESSOR J. ALLEN, *to the senior Editor, dated, Cincinnati, Dec.* 15*th*, 1851.

DEAR SIR: I have the pleasure of informing you, that I have so far perfected my improved method of mounting artificial teeth upon metallic plates, that I have adopted it exclusively in my practice, which I find much more satisfactory to myself and my patients, than any other method I have heretofore known. This improvement consists in uniting single teeth to each other, and to metallic plates, in such a manner as to form a most perfect and continuous gum upon artificial dentures, without the slightest check or crack. It has been subjected to

the severest tests during the past two years, but more especially, within the last year, by myself and others, as there are now some twenty dentists, in different parts of the union, who have adopted this method in their practice, all of whom have expressed their decided preference for this style of work. I intend soon to send you some specimens of this improvement, for the Baltimore College of Dental Surgery, if they would be acceptable.

SELECTED ARTICLES.

ARTICLE X.

Teeth—Comparative Anatomy.

[Sing. *a tooth; Tunth,* Teut.; *Dens,* Lat; *Dente,* Ital.; *Dent,* Fr.; *Tand,* Dan.; *Tain,* Old English; *Zahn,* Germ.; *Dant,* Welsh; *Dend,* Erse; *οδους-ιδοντος,* Gr.; *Dantis,* Lithuanic; *Dantas,* Sanscrit.*]

A tooth is a hard body attached to the mouth or commencement of the alimentary canal, always exposed, save where its development is permanently arrested, as in the rudimental tusk of the Narwhal; commonly calcified, the exceptions being few, *e. g.*, the horny teeth of the lamprey and platypus. Teeth vary, not only in their tissue, but still more in number, size, form, structure, position and mode of attachment, in different animals: they are principally adapted for seizing, tearing, dividing, pounding or grinding the food; in some they are modified to serve as weapons of offence and defence; in others, as aids in locomotion, means of anchorage, instruments for uprooting or cutting down trees, or for transport and working of building materials; they are characteristic of age and sex; and in man they have secondary relations, subservient to beauty and to speech.

Teeth are always most intimately related to the food and hab-

*These synonyms are cited as illustrative of the coincidence in one of the primary words of a natural class of languages that prevails from the East Indies, through the west of Asia and across Europe, and as indicative of the unity of stock of the great Indo-European family of mankind.

its of the animal, and are therefore highly interesting to the physiologist: they form, for the same reason, most important guides to the naturalist in the classification of animals; and their value as zoological characters is enhanced by the facility with which, from their position, they can be examined in living or recent animals; whilst the durability of their tissues renders them not less available to the palæontologist in the determination of the nature and affinities of extinct species, of whose organization they are often the sole remains discoverable in the deposits of former periods of the earth's history.

Although there are many analogous structures in the invertebrate classes, true calcified teeth are peculiar to the vertebrata, and may be defined as bodies primarily, if not permanently, distinct from the skeleton, consisting of a cellular and tubular basis of animal matter containing earthy particles, a fluid, and a vascular pulp.

In général, the earth is present in such quantity as to render the tooth harder than bone, in which case the animal basis is gelatinous, as in other hard parts where a great proportion of earth is combined with animal matter. In a very few instances among the vertebrate animals, the hardening material exists in a much smaller proportion, and the animal basis is albuminous; the teeth here agree, in both chemical and physical qualities, with horn.

True teeth consist commonly of two or more tissues, characterised by the proportions of their earthy and animal constituents, and by the size, form, and direction of the cavities in the animal basis, which contains the earth, the fluid, or the vascular pulp.

The tissue which forms the body of the tooth, is called "dentine," (*Dentinum*, Lat.; *Zahnbein*, *Zahnsubstanz*, Germ.; *l' Ivoire*,* Fr.)

The tissue which forms the outer crust of the tooth, is called "cement" (*cæmentum*, *crusta petrosa*, Lat.)

*The learned author of the article "Secretions," in the "Dictionnaire Universel d'Histoire Naturelle," 8vo, 1848, adopts the term "Dentine" in prefer-

The third tissue, when present, is situated between the dentine and cement, and is called "enamel" *encaustum*, *adamas*, Lat.)

"*Dentine*" consists of an organized animal basis disposed in the form of extremely minute tubes and cells, and of earthy particles: these particles have a twofold arrangement, being either blended with the animal matter of the interspaces and parietes of the tubes and cells, or contained in a minutely granular state in their cavities. The density of the dentine arises principally from the proportion of earth in the first of these states of combination, the tubes and cells contain, besides the granular earth, a colorless fluid, probably transuded "plasma" or "liquor sanguinis," and thus relate not only to the mechanical conditions of the tooth, but to the vitality and nutrition of the dentine.

This typical structure of dentine is well illustrated in the article *tooth:* such "true dentine" has no canals large enough to admit capillary vessels with the red particles of blood, and it has been, therefore, called "unvascular dentine."

The simplest modification of dentine is that in which capillary tracts of the primitive vascular pulp remain uncalcified, and permanently carry red blood into the substance of the tissue. These so-called "medullary canals" or "vascular canals" present various dispositions in the dentine which they modify, and which I have proposed to call "vaso-dentine." It is often combined with true dentine in the same tooth; *e. g.* in the scalpriform incisors of certain rodents,* the tusks of the elephant,† the molars of the extinct iguanodon.‡

ence to Cuvier's name "ivoire," and after defining its properties, observes, "Sur ces divers rapports, le mot *dentine*, par lequel M. R. Owen les désigne, me paraît très heureux." The term "ivory" unavoidably recalls the idea of the peculiar modification of "dentine," which characterises the tusks of the elephant, mammoth and mastodon; but, besides this objection to its more general application, the word is used in a still wider sense in the "Leçons d'Anatomie Comparée:" "Les unes (dents) en effet, ont la partie enfoncée dans l'alvéole dénuée d'émail; cette partie, ou la racine, ne se compose généralement que de l'*ivoire* intérieure, recouvert très rarement d'*ivoire* extérieure (les dents de cachalot;") tom. iv. Ed. posth. 1836, p. 200. The example cited of the tissue here denominated "ivoire extérieure," is the "cement." See my "Odontography," p. 355, pl. 89.

* Odontography, 4to, p. 405. † Ib. p. 643. ‡ Ib. p. 251.

A third modification of the fundamental tissue of the tooth is where the cellular basis of the dentine is arranged in concentric layers around the vascular canals, and contains "radiated cells" like those of the osseous tissue: it is called "osteo-dentine." The transition from dentine to vaso-dentine, and from this to osteo-dentine, is gradual, and the resemblance of osteo-dentine to true bone is very close.

"*Cement*" always closely corresponds in texture with the osseous tissue of the same animal; and wherever it occurs of sufficient thickness, as upon the teeth of the horse, sloth, or ruminant, it is also traversed, like bone, by vascular canals. In reptiles and mammals, in which the animal basis of the bones of the skeleton is excavated by minute radiated cells, forming with their contents the "corpuscles of Purkinje," these are likewise present, of similar size and form, in the "cement," and are its chief characteristic as a constituent of the tooth. The hardening material of the cement is partly segregated and combined with the parietes of the radiated cells and canals, and is partly contained in disgregated granules in the cells, which are thus rendered white and opaque, viewed by reflected light. The relative density of the dentine and cement varies according to the proportion of the earthy material, and chiefly of that part which is combined with the animal matter in the walls of the cavities, as compared with the size and number of the cavities themselves. In the complex grinders of the elephant, the masked boar, and the capybara, the cement, which forms nearly half the mass of the tooth, wears down sooner than the dentine.

The "*enamel*" is the hardest constituent of a tooth, and, consequently, the hardest of animal tissues; but it consists, like the other dental substances, of earthy matter arranged by organic forces in an animal matrix. Here, however, the earth is mainly contained in the canals of the animal membrane; and, in mammals and reptiles, completely fills those canals, which are comparatively wide, whilst their parietes are of extreme tenuity. The hardening salts of the enamel are not only present in far greater proportion than in the other dental tissues,

Fig. 1.

Section of pharyngeal tooth of Labrus, magnified. (*Owen's Odontography.*)

Fig. 2.

Section of tooth of Lamna, magnified. (*Owen's Odontography.*)

but, in some animals, are peculiarly distinguished by the presence of fluate of lime.

The following are characteristic examples of the above defined tissues, and their different combinations, in different teeth.

The examples are extremely few, and, as far as I know, are peculiar to the class *pisces*, of calcified teeth which consist of a single tissue, and this is always a modification of dentine. The large pharyngeal teeth of the wrasse (*labrus*) consist of a very hard kind of unvascular dentine. *Fig.* 1, shows a vertical section of one of these teeth, supported upon the very vascular osseous tissue of the pharyngeal bone: *p* is the pulp cavity.

The next stage of complexity is where a portion of the dentine is modified by vascular canals. Teeth, thus composed of dentine and vaso-dentine, are very common in fishes. The hard dentine is always external, and holds the place, and performs the office, of enamel in the teeth of higher animals; but it is only analogous to enamel, not the same tissue.* *Fig.* 2, illustrates this structure in a longitudinal section

* Odontography, pp. 17, 37.

of a tooth of a shark of the genus *lamna*: *v* is the vaso-dentine; *d* the hard dentine; the earthy constituent so predominates that the tissue takes a polish like enamel, for which it has commonly been mistaken in the teeth of fishes: I have called it "vitro-dentine."

The molars of the dugong are examples of teeth composed of dentine and cement, the latter tissue forming a thick external layer. *Fig.* 3. A is a transverse section of the crown

FIG. 3.

Section of tooth of Dugong (halicore,) magnified.

of the second molar, natural size; and B a magnified view of a portion of the section; *d* the dentime, remarkable for the number of minute calcigerous cells at its periphery; and *c* the cement.

In the great teeth of the lower jaw of the cachalot, the pulp-cavity of the growing tooth becomes filled up by osteo-dentine, the result of a modified calcification of the dentinal pulp; and the full grown tooth presents three tissues, as shown in

fig. 4, in which *c* is the thick external cement, *d* the hard dentine, and *o* the osteo-dentine; sometimes developed in loose stalactitic-shaped nodules.

In the teeth of the sloth, and its great extinct congener, the megatherium, the hard dentine is reduced to a thin layer, and the chief bulk of the tooth is made up of a central body of vaso-

FIG. 4.

FIG. 5.

Section of tooth of Megatherium.

Section of tooth of Cachalot (physeter.)

dentine, and a thick external crust of cement. *Fig.* 5 represents a longitudinal section of a lower molar of the megatherium, of half the natural size: *v* is the vaso-dentine, *d* is the hard dentine, and *c* is the cement; *p* is the base of the wide persistent pulp-cavity.

The hard dentine is, of course, the firmest tissue of a tooth so composed, and forms the crest of the transverse ridges of the grinding surface, like the enamel plates in the elephant's grinder. It has, consequently, been described to be enamel,* but its relation to that tissue is only one of analogy or function.

The human teeth, and those of the carnivorous mammals, appear at first sight to be composed of dentine and enamel only, as they were described to be by the Cuviers,† who called them, therefore, simple teeth; but their crowns are originally, and their fangs are always, covered by a thin coat of cement. There is also commonly a small central tract of osteo-dentine in old teeth.

Fig. 6.

Section of incisor of a Horse (equus.)

In *fig*. 7, pl. 122, of my Odontography is given a longitudinal section of a human molar tooth, in which *d* is the dentine, *e* the enamel, and *c* the cement.

The teeth, called by Cuvier compound or complex in mammalia, differ, as regards their composition, from the preceding, only by the different proportion and disposition of the constituent tissues. *Fig*. 6, is a longitudinal section of the incisor of a horse; *d* is the dentine, *e* the enamel, and *c* the cement; *c'* is the layer of cement reflected into the deep central depression of the crown; and *s* is the colored mass of tartar and particles of food which fills up that cavity, forming the "mark" of the horse-dealer. The characteristic structure of the three tissues is shown in the magnified part of the section, *fig*. 7.

A very complex tooth may be formed out of two tissues by the way in which these may be interblended, as the result of an

*Cuvier, Ossemens Fossiles, 4to, t. v., pt. 1., p. 172.; and Clift, Transactions of the Geological Society, 1835, p. 438.

†F. Cuvier, Dents de Mammifères, p. 1. 8vo, 1825; G. Cuvier, Leçons d'Anat. Comp. iv, (1836,) p. 199.

original complex disposition of the constituents of the denta matrix.

Certain fishes, and a singular family of gigantic extinct batrachians, which I have called "labyrinthodonts,"* exhibit, as the name implies, a remarkable instance of this kind of complexity. *Fig.* 8, is a view of a canine tooth of the *labyrin-*

Fig. 8.

Fig. 7.

Magnified portion of section of incisor of Horse ; c cement, *e* enamel, *d* dentine.

Tooth of a Labyrinthodon, natural size.

thodon salamandroïdes, of the natural size: and *fig.* 9, is a slightly magnified view of a transverse section across the part of the crown marked *a*. At first view, the tooth appears to be of the simple conical kind, with the exterior surface merely stri-

* Proceedings of the Geological Society, Jan. 20, 1841, p. 267.

ated longitudinally, but every streak is a fissure into which the very thin external layer of cement (*c*) is reflected into the body

Fig. 9.

Transverse section of tooth of Labyrinthodon. (Magnified.)

of the tooth, following the sinuous wavings of the lobes of dentine *d*, which diverge from the central pulp-cavity, *a*.

The inflected fold of cement *c* runs straight for about half a line, and then becomes wavy, the waves rapidly increasing in breadth as they recede from the periphery of the tooth; the first two, three, or four undulations are simple; then their contour itself becomes broken by smaller or secondary waves; these become stronger as the fold approaches the centre of the tooth, when it increases in thickness, and finally terminates by a slight dilatation or loop close to the pulp-cavity, from which the free margin of the inflected fold of cement is separated by an extremely thin layer of dentine. The number of the inflected converging folds of dentine is about fifty at the middle of the crown of the tooth figured, but is greater at the base. All the inflected folds of cement at the base of the tooth have the same complicated disposition with increased extent; but, as they approach their termination towards the upper part of the tooth, they also gradually diminish in breadth, and consequently penetrate to a less distance into the substance of the tooth.

Hence, in such a section as is delineated (*fig.* 9,) it will be observed that some of the convoluted folds, as those marked *cc*, extend near to the centre of the tooth; others, as those marked *c′*, reach only about half-way to the center; and those folds, *c″*, which, to use a geological expression, are "cropping out," penetrate to a very short distance into the dentine, and resemble, in their extent and simplicity, the converging folds of cement in the fangs of the tooth of the ichthyosnurus.

The disposition of the dentine is still more complicated than that of the cement. It consists of a slender, central, conical column, excavated by a conical pulp-cavity for a certain distance from the base of the tooth; and this column sends radiatting outwards, from its circumference, a series of vertical plates, which divide into two once or twice before they terminate at the periphery of the tooth.

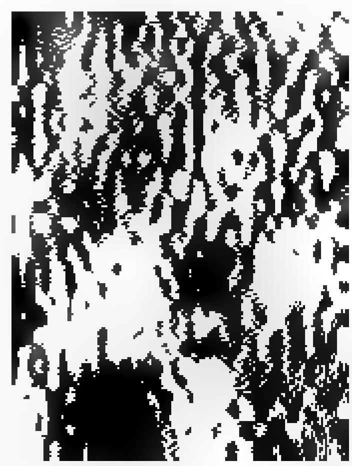
Each of these diverging and dichotomising plates gives off throughout its course smaller processes, which stand at right angles, or nearly so, to the main plate; they are generally opposite, but sometimes alternate; many of the secondary plates or processes, which are given off near the center of the tooth, also divide into two before they terminate; and their contour is seen, in the transverse section, to partake of all the undulations of the folds of cement which invest and divide the dentinal plates and processes from each other.

The dental pulp-cavity is reduced to a mere line, about the upper third of the tooth, but throughout its whole extent fissures radiate from it, corresponding in number with the radiating plates of dentine. Each fissure is continued along the middle of each plate, dividing where this divides, and extending along the middle of each bifurcation and process to within a short distance of the line of cement. The pulp fissure commonly dilates into a canal at the origin of the lateral processes of the radiating plates, before it divides to accompany and penetrate those processes.

The main fissures or radiations of the pulp-cavity extend to within a line or half a line of the periphery of the tooth, and suddenly dilate at their terminations into spaces, which in trans-

verse section, are subcircular, oval, or pyriform, *p*: the branches of the radiating lines, which are continued into the lateral secondary plates or processes of the dentinal lamellæ, likewise dilate into similar, and generally smaller spaces. All these spaces, or canals, in the living tooth, must have been occupied by corresponding processes of the vascular pulp: they constitute so many centers of radiation of the fine calcigerous tubes, which with their uniting clear substance, constitute the dentine.*

Fig. 10



Tooth of a Dendrodus, natural size.

An analogous complexity is produced by numerous fissures radiating from a central mass of vaso-dentine, which more or less fills up the pulp-cavity of the seemingly simple conical teeth of the extinct family of fishes which I have called "Dendrodonts."† *Fig.* 10, is one of these fossil teeth, of the natural size; *a* a transverse section; and *fig.* 11, a reduced view of a portion of the same section, enlarged twenty diameters.

Thus magnified, a central pulp-cavity, of relatively small size, and of an irregular lobulated form, is discerned, a portion of which is shown at *p*; this is immediately surrounded by the transverse sections of large cylindrical medullary or pulp canals of different sizes; and, beyond these, there are smaller and more numerous medullary canals, which are processes of the central pulp-cavity. In the transverse section these processes are seen to be connected together by a net-work of smaller medullary canals belonging to a coarse osseous texture into which the pulp has been converted, and this structure occupies the middlehalf of the section. All the medullary canals were filled by the opaque matrix. From the circumference of the central net-work, straight medullary fissures radiate at pretty regular intervals to the periphery of the tooth: most of these canals divide once, rarely twice, in their course; the division taking place sometimes at their origin, in others at different distances

*Odontography, pp. 195—217, pl. 64 A, 64 B. † Ib., p. 171.

FIG. 11

Transverse section of a tooth of Dendrodus. *A*, natural size; *B*, the portion *c*, of *A*, magnified twenty diameters.

from their terminations, and the branches diverge slightly as they proceed. Each of the above medullary fissures is continued from a short process of the central structure, which is connected by a concave line with the adjoining process, so that the whole periphery of the transverse section of the central coarse reticulo-medullary body of the tooth presents a crenate outline. From each ray and its primary dichotomous divisions, short branches are sent off at brief intervals, generally at right angles with the trunk, or slightly inclined towards the periphery of the tooth. These subdivide into a few short ramifications, like the branches of a shrub, and terminate in irregular and somewhat angular dilatations, simulating leaves, but which resolve themselves into radiating fasciculi of calcigerous tubes. There are from fifteen to twenty-five or thirty-six of these short and small lateral branches on each side of the medullary rays.

A third kind of complication is produced by an aggregation of many simple teeth into a single mass.

The examples of these truly compound teeth* are most common in the class of fishes, but the illustration here selected is from the mammalian class. Each tooth of the cape ant-eater (*orycteropus*) presents a simple form, is deeply set in the jaw, but without dividing into fangs; its broad and flat base is porous, like the section of a common cane. The canals to which these pores lead contain processes of a vascular pulp, and are the centers of radiation of as many independent series of dentinal tubules. Each tooth, in fact, consists of a congeries of long and slender prismatic denticles of dentine, which are cemented together by their ossified capsules, the columnar denticles slightly decreasing in diameter and occasionally bifurcating as they approach the grinding surface of the tooth.

Fig. 12.

Part of transverse section of the tooth of the Orycteropus. (Magnified.)

A figure of a longitudinal section of the molar teeth is given in pl. 76, *fig.* 10, of my "Odontography," and a magnified view of a similar section in pl. 77; *fig.* 12, gives a magnified view of a portion of the transverse section of the fourth molar, showing *c* the cement; *d* the dentine; *p* the pulp-cavity of the denticles; and *d* a section of one of the denticles just beyond its bifurcation.

The pectinated incisors of the flying lemur of the Indian Islands (*galeopithecus*) are exam-

* "In the "Lecons d'Anatomie Comparée" of Cuvier, the teeth, in which folds of enamel and cement penetrate the entire substance of the crown, are called "compound:" "Nous appellons 'dent composée' celle dont les différentes substances forment des replis tellement profonds, que dans quelque sens qu'on coupe la dent, on coupe plusieurs fois chacune des substances qui la composent: telles sont les dents molaires de l'*Eléphant*." The teeth of the "Labyrinthodonts" would come under this definition more truly than those of the elephant, although they differ from them in having no enamel; for a molar of an elephant might be bisected, vertically and transversely, without cutting the tissues across more than once.

ples of teeth, the crowns of which are composed of denticles consisting of hard dentine, with a covering of true enamel. The layer of cement over this is too thin to show its characteristic structure, and does not fill up the intervals of the denticles, which stand out as free processes from the base of the crown. Tubular prolongations of the pulp-cavity are continued up the center of each denticle.

Fig. 13, exhibits a longitudinal section magnified, of this kind of compound tooth: *d* is the dentine; *e* the enamel; *p*

Fig. 13.

Section of lower incisor of Galeopithecus. (Magnified.)

the pulp-cavity. The originally detached summits of the crown of the human incisor are homologous with these columnar processes, or denticles of the incisor of the *galeopithecus*.

In the compound molars of the great African wart-hogs (*phacochærus*) the columnar denticles are in three rows, and their interspaces are filled up by cement: each denticle consists of

a slender column of hard dentine inclosed in a thick sheet of enamel, the whole being bound together by the cement; and the denticles, as in the *galeopithecus*, blending together into a common base in the fully developed tooth.

A figure is given of the grinding surface of the third true molar of the *phacochærus pallasii*, in pl. 140, *fig.* 4, of my "Odontography."

In the elephant the denticles of the compound molars are in the form of plates, vertical to the grinding surface and transverse to the long diameter of the tooth. When the tooth is bisected vertically and lengthwise, the three substances, *d* dentine, *e* enamel, and *c* cement, are seen interblended as in *fig.* 14, in which *p* is the common pulp-cavity, and *r* one of the roots of this complex tooth.

Fig. 14.

Section of molar of Elephant.

A still more complex grinding apparatus is found in certain fishes. The lower pharyngeal bone of the parrot-fish (*scarus**,) for example, supports a dental plate with a triturating surface like that of the compound molars of the *phacochærus*. The interlocked upper pharyngeals (*fig.* 22,) support dental masses with a grinding surface more like that of the compound molars of the elephant.

When a vertical and longitudinal section is made of one of these upper pharyngeal compound teeth, each denticle is seen to be composed, as in *fig.* 15, of a body of very hard and unvascular dentine *d*, with a thick sheath of enamel *e*, the denticles being united together by the cement *c*, and supported and further united together, and to the pharyngeal bone, by a basal mass of vascular osteo-dentine.

* Odontography, pl. 51, fig. 3.

FIG. 15.

Two of the upper pharyngeal teeth, Scarus. (Magnified.)

Such are some of the prominent features of a field of observation which comparative anatomy opens out to our view; such the varied nature, and such the gradation of complexity of the dental tissues, which, up to December, 1839,* continued notwithstanding successive approximations to the truth, to be described in systematic works as a "phaneros," or "a dead part or product exhaled from the surface of a formative bulb!" The truth may be slowly, but as surely established, subject to the usual attempts to mask or detract from the merit of the discovery. By no systematic authors has the hypothesis of the formation of dentine by transudation or secretion been more frequently or more explicitly enunciated than by the Cuviers. Baron Cuvier repeats, in both editions of his elaborate work—

* See the Fasciculus of M. de Blainville's great work, "Ostéographie et Odontographie d'Animaux Vertébrés," which he submitted to the Academy of Sciences of the Institute of France on the same day, December 16th, 1839, on which I communicated, on the occasion of my election as corresponding member of that body, my "Theory of the development of dentine by centripetal calcification and conversion of the cells of the pulp."

the "Ossemens Fossiles"—"C'est dans ce vide concevable que se déposeront les matiéres qui doivent former la dent, savoir: la substance vulgairement appelée *osseuse*, qui sera transudée par des productions gelatineuses venant du fond de la capsule, et l'émail qui sera déposé par les cloisons membraneuses." t. ii, p. 61, ed. 1812; t. i. p. 33, ed. 1821. See also M. F. Cuvier, "Dents de Mammifères," 8vo, 1825. "L'ivoire se dépose par couches concentriques," p. xxvii; "L'émail se dépose dans un sens contraire l'ivoire," ib. p. xxviii. And Baron Cuvier again, in the second edition of his "Leçons d'Anatomie Comparée," t. iv. 1836, p. 213: "L'ivoire se dépose par couches, par une sorte de transudation." In the first edition of his classical work, Cuvier had illustrated the peculiarity of the teeth of certain fishes, which are at first detached and afterwards united to the jaw bone, by comparing their growth to that of the epiphyses of the long bones: "Mais les dents qui ne tiennent qu'à la gencive seulement, comme celle des *Squales*, croissent à la manière des epiphyses des os, c'est-à-dire que toute leur substance osseuse est d'abord tendre et poreuse, et qu'elle se durcit uniformèment, et finit par devenir entiérement dure comme de l'ivoire," t. iii. 1805, p. 112. Whether the great anatomist meant to imply that the osseous tissue of the epiphyses of bones was developed differently from osseous tissue in general, *e. g.* by the uniform and simultaneous hardening or calcification, obscurely referred to in the above quotation, may be questioned, for such is not the way in which the teeth of the shark are calcified. But this is certain, that the idea, whatever it might have been, had no influence on the fixed belief of the development of the dental tissue by transudation expressed in their later and more elaborate works by Baron Cuvier and his accomplished brother; and, in point of fact, the passage which I have quoted is expunged from the second edition of the "Leçons d'Anatomie Comparée," 1835: the successive stages of calcification in the different teeth of the same vertical series in the jaw of the shark, having probably been noticed in the interim by Cuvier.

The author of the article "Sécrétions" in the "Dictionnaire

Universel d'Histoire Naturelle," has, however, reproduced Cuvier's obscure comparison of certain fishes' teeth to the epiphyses of bone, as evidence of the needlessness of any ulterior researches for the demonstration of the theory of dental development by conversion and calcification of the pulp. The passage from the third vol. of the old edition (1800) of the "Leçons d'Anat. Comp." p. 112, is cited to show that it naturally conducts to the knowledge of such mode of development of dentine: "En 1840 et 1841 (the 'Comptes Rendus de l'Acad. des Sciences' give the true date) l'étude des dents de Squale par M. R. Owen, lui a démontrée leur accroissement par intussusception, comme elle avait été à G. Cuvier trente-cinq années auparavant." How or why G. Cuvier came to abandon the theory so demonstrated, and how it happened that none of his contemporaries adopted it, M. Duvernoy does not explain. He does give a reason for the omission, in the second edition of the "Leçons d'Anat. Comp." of the passage which he affirms to contain the demonstration: Malheureusement, le copiste de cet ancien texte pour la 2de édition a omis ce passage, par oubli." It was natural to conclude that its obscurity and seeming contradiction to the theory of dental development, formerly propounded by Cuvier, as well as to the facts shown by nature in the sharks, had been the cause of its omission; but even had the misfortune to which M. Duvernoy now attributes that omission (for in the copious list of addenda and corrigenda to the fifth, 1837, and final, 1846, volumes it is not noticed) not occurred, the coincidence of such passages as the following would still have been inexplicable and irreconcilable with the deductions that M. Dumeril is now enabled to draw from the comparison of the shark's tooth with the epiphyses of long bones. "L'ivoir se dépose par couches, par une sorte de transudation." Leçons d'Anat. Comparée, t. iv., 1836, p. 214. To which proposition Cuvier has himself added a note: "Je me suis assuré récemment, sur des germes de dents d'éléphant, que la substance osseuse de la dent se forme comme les coquilles." And the editor, (M. Duvernoy,) in order to obviate any possibility of misconception, has himself subjoined a note to that passage, as follows: "L'*ivoire* a été

aussi appellé *substance osseuse*, à cause de son analogie de composition chimique et de dureté avec les os. Mais la nature inerte et inorganique de cette substance, mieux appreciée dans ces derniers temps, surtout par les travaux de M. Cuvier, ne permet plus de la désigner, avec justesse, par cette seconde expression. Du moins est-il nécessaire de prémunir le lecteur contre l'ideé fausse qu'il pourrait en tirer, qu'elle serait organisée, qu'elle se développerai, à la maniére des os." Tom. cit. p. 201, (1836.) In the same spirit in which M. Duvernoy sees (in 1848) that a true idea, instead of a false one, may be drawn from casual expressions and similies loosely applied in the old Leçons of 1800 and 1805 ; others have sought to depreciate the value of the establishment of the truth by citing the doubts, or tentative approximations made by Purkinje and Schwann to my theory, interpreting such approximations by the light of the established truth. So far from finding such a resting place for doubt in Cuvier's early simile, cited by M. Duvernoy in 1848, or in the interrogatories of Schwann, nothing short of the investigation of the whole of this vast subject, zootomically, developmentally, and microscopically, as narrated in my "Odontography," sufficed to settle my own doubts ; and nothing short of the evidence and illustrations given in that work appeared to me adequate to convert anatomists from the excretion-hypothesis to the intussusception theory.

That the dentine is the ossified pulp is an older notion than that it is an inorganic secretion from such pulp. But an hypothesis, to be of any value in science, must be proved. Almost every true theory has been indicated, with various degrees of approximation, before its final establishment: but he has even been held, in exact philosophy, to be the author of a theory, by whom it has been first rightly enunciated and satisfactorily established. When time has dissipated the mists of individual or national rivalries and jealousies, the name of the true discoverer is clearly seen by the inextinguishable light of true and impartial history: and to that period I look forward with calm and confident hope.

(To be Continued.)

ARTICLE XI.

First operation for the restoration of the lip. January 14th, 1850, in the presence of the class at the medical college I abraded the upper edge of the skin corresponding to the lower lip, to the extent of a quarter of an inch each way from the center; from either extremity of this horizontal incision I cut perpendicularly about one inch, and then starting from the lower end of these incisions, I carried the knife outward and downward to the left, and outward and downward to the right, one inch and a half. The two lateral pieces thus marked out, were now dissected from the jaw and slid upward and drawn together with sutures, above the central piece; the lower edge of the lateral pieces thus united were stitched also to the upper and abraded edge of the central piece.

The object in leaving a central piece attached to the jaw, and uniting the lateral pieces above it, was to prevent the lateral pieces, which were to constitute the new lip, from drawing down again by the contraction of the wound below. The plan was original, I believe, and proved successful. The new lip, however, became, in process of time, through stretching and shrinking, insufficient, and I made a second operation to increase the depth of the lower lip, and prevent more effectually the saliva from dribbling from the mouth.

Second Operation, August 28th, 1850, at my office, in presence of Drs. Samuel Carey, Camp, and others. My mode of procedure was entirely new, and as I believe, has established an important principle in this class of operations. The operation was as follows: a single incision was made just under the chin, extending along the lower edge of the inferior maxilla, about three inches from side to side. All the integument comprised between this horizontal incision and the upper edge of the lower lip, was now raised from the bone, and the entire mass was slid upward until its lower edge was made to correspond with a line just below the upper border of the jaw. Here this edge was made fast to the *periosteum*, by several interrupted sutures. The gaping wound below was left to close by granulation. The result has been, that adhesion occurred between the lower edge of the flap thus secured, and the periosteum, and no disposition was afterwards shown in the flap to

draw downward as the wound cicatrized; but on the contrary, the skin from below, that is, from under the chin and the neck, was somewhat drawn upward, and thus between the formation of new skin and contraction of the skin from below, the wound closed.

The new principle established, is, that *by attaching the skin directly to the* PERIOSTEUM *its displacement by cicatrization, and contraction is prevented.* Every one who has operated for the restoration of the lower lip, will see the advantages which this plan offers. There is nothing to which the upper, free border of the new lip can be attached, and there is, consequently, nothing but the mere transverse tension of the lip, to prevent its descending as cicatrization progresses below. This tendency I sought to avoid in the first operation by leaving a central piece untouched and adherent to the bone, and then bringing the new lip above it. But this procedure requires a sacrifice of a portion of the transverse diameter of the lip, and is often wholly inadmissible, and always objectionable, if the same end can be attained by another mode. This new mode, as we have demonstrated, prevents the sliding downward, without sacrificing any portion of the lip. These remarks are applicable especially to cases of *complete* loss of the lip. Where only a portion is lost, various other methods of supplying the deficiency may be practiced; as by stretching the lip, or sliding from the cheeks, or even by an operation of "torsion" from the cheeks.

This idea originated in having observed elsewhere the capacity of periosteum to form skin. I have several times proved, contrary to the often repeated doctrine, that skin may form *de novo*, independent of old skin: as where there has been an extensive destruction of the integuments over a bone—where the parts have been torn away or have sloughed quite to the periosteum, and, consequently, no old skin could have been left from which the new could form, except at the edges; yet in the very center of this broad ulcer, new skin has sprung up like an oasis, and gradually spread outward in all directions. But this has always been where the periosteum was actually exposed, which first becoming white and spongy, has soon shown itself

to be the nucleus of a new skin—in fact, it has become ***itself converted into skin***, remaining ever afterwards depressed, immovable and adherent to the bone at that point.

The result of the case of the lad Neuman, is, that he has a lower lip, sufficient to cover the gums and a part of the bodies of a set of artificial teeth which our ingenious dentist, Dr. Harvey, has made for him. The lip is narrow, for we have not yet been able to prevent the contraction and rolling in of the upper edge, as it heals, but it would certainly have been much narrower, or entirely lost if the adhesion to the periosteum had not bcen effected.

I will not omit to say, that by the constant effort to use the lower lip, or perhaps simply by the lapse of time, the lip has very perceptibly lengthened in its vertical diameter during the last six months.

ARTICLE XII.

On a Case of Extensive Injury to the Jaw, following the removal of an Incisor Tooth by the Keyed Instrument. Remarks on the Extraction of Deciduous Teeth. By Thomas Underwood, Esq., Honorary Dentist to the St. George's and St. James' Dispensary.

The following case exemplifies the injury that may be done to the maxillæ by the too forcible extraction of the temporary teeth, particularly where there is a scrofulous tendency in the constitution.

The patient is a young lady, fourteen years of age, the appearance of whose face is very peculiar: the lower jaw is excessively pointed, presenting a sharp, wedge-like appearance, instead of the natural rounded form; and the following peculiarities are to be observed in the interior of the mouth: the four permanent incisors and left canine, in the lower jaw, are wanting, together with their alveoli; the right canine occupies the place of the right central incisor; and the bicuspids, or small molar teeth, branch off on each side. There is a small

space of an eighth of an inch between the canine and left bicuspids, but the other teeth are in close contact. The jaw consequently contains nine, instead of fourteen, the usual complement of teeth at this age.

The account which I received from my patient and her friends was, that six years ago one of the temporary incisor teeth was removed by the key—an instrument, the use of which was evidently unnecessary for a temporary tooth, more especially a temporary incisor. After the extraction, an abscess formed under the chin, about half an inch from the symphysis, which ultimately pointed outward, and continued discharging pus for four years, exfoliated bone being now and then thrown off. Granulations then sprang up, and the wound healed. The result of the injury was, that five of the front teeth, with their alveoli, and a portion of the lower maxilla, an inch and a quarter in length, have disappeared.

A tumor having lately again formed, in much about the same position as the former abscess, the medical man in attendance on the case, though he believed it to be an enlargement of the submaxillary gland, was nevertheless anxious that a dentist should examine the mouth. I was accordingly consulted, but found the teeth all sound, and my opinion coincided with his, that it was an enlargement of the gland, which, owing to the angular state of the jaw, appeared to be protruded into the cavity of the mouth. The tumor has almost disappeared under the use of the compound iodine ointment. The patient is evidently scrofulous, which circumstance will, in a great measure, account for the extensive injury which has occurred; yet the operator was much to blame who used such an instrument as the key, so rarely admissible, even in adult cases, to extract a temporary *incisor* tooth. The result has been a disfigurement, which no art can rectify; but one or two lessons may be gathered from the case—viz. whenever we are called upon to remove deciduous teeth, the constitutional tendency of the little patient ought to be considered, and this is especially a matter of primary importance where any degree of force is to be used. Again, though parents, and even many practitioners, are in favor of extracting the temporary teeth, as soon as the permanent ones

make their appearance, experience points to the contrary course; and I have invariably seen, in my practice, that the longer the first teeth can be retained in the jaw the better, for irregularity arising from their removal being deferred, can always be rectified and contraction resulting from too early extraction is beyond our power. Even in cases where children suffered from tooth-ache of the temporary teeth, I have always found a simple fomentation of water, as hot as it can be borne, applied for half an hour to the outside of the cheek, opposite the seat of pain, together with a gentle aperient, sufficient to afford entire relief; and by this means the teeth may be retained until their successors displace them, or at least until they may be removed with very little force.—*London Lancet.*

ARTICLE XIII.

On the Dissolving of Teeth in Solution of Sugar.

SIR: The dissolution of teeth in lactic acid is known, as well as that sugar solution produces "lactic acid" by fermentation. The tooth I used for the experiment was a thoroughly sound one, without the least speck, and nineteen grains in weight. I put it in a solution of six drachms of sugar and three drachms of water, in a temperature of 32°—36°. In three weeks, the tooth lost about seven grains, with a change in the solution, and, in analyzing it, I found that only the carbonate and phosphate of lime were consumed. The part round the crown of the tooth was unchanged. The tooth lost, afterwards, when I put it in diluted hydrochloric acid, all its limy substance in the course of twenty-four hours, with a small influence of carbonic acid. Another tooth which I put in diluted hydrochloric acid lost in twenty-four hours all its limy substance, but under the influence of a great deal of carbonic acid. A tooth remained unchanged in very concentrated camphor solution.

A tooth, nine grains in weight, put in a solution of half a drachm of oxalic acid and three drachms of water, in a temperature of 32°—36°, lost, in ten days, two grains and a half of

its weight. It was found with a white sediment (oxalate of lime) and weighed four grains. The enamel was found quite dissolved; the other part of the tooth was not altered.

T. LINSER.

[*London Lancet.*

ARTICLE XIV.

Removal of a Tumor imbedded in the Parotid Gland.

MR. CAUTON related the following particulars of a case which came under his hands before the Westminster Medical Society.

A man, aged sixty, had for several years been afflicted with amaurosis of both eyes, for which mercury, strychnine, galvanism, and other remedies, had been ineffectually employed. Some time since he complained of a swelling below the left ear, and which had gradually increased in size. It gave no pain; but by degrees the resulting inconveniences were, difficulty in mastication, deglutition, and great impairment of hearing. The tumor was firmly wedged in between the ramus of the jaw and the mastoid process, extending chiefly towards the angle of the former. The skin over it was healthy and unadherent, and to the touch it was firm and resisting. *Operation:* The superficial incision was commenced at the zygoma, extended thence, in a curved direction, along the anterior boundary of the tumor, and terminated a little way behind the angle of the jaw. The flap being dissected backwards, the tumor was seized by a double hook; and as traction was therewith made upon it, the knife isolated it from its connections. A portion of the surrounding parotid gland required to be likewise removed. The depth to which the tumor extended was greater than the extent of its growth superficially; and on removal, it was seen to be an enlarged and apparently fungoid state of a lymphatic gland, inclosed in a strong, fibrous-looking capsule. The hemorrhage was trivial, and the patient recovered without any paralysis of the face, and with restoration of the power of mastication, deglutition and hearing.

BIBLIOGRAPHICAL.

A Systematic Treatise, Historical, Etiological and Practical, on the Principal Diseases of the Interior Valley of North America, as they Appear in the Caucasian, African, Indian and Esquimaux Varieties of its Population. By Daniel Drake, M. D.

In a previous notice of this work, we called the attention of our readers to its original character, as its most characteristic feature, and in again alluding to it after a more attentive perusal of its contents, we are constrained to note once more this peculiarity. Dr. Drake, during a long period, devoted to the duties of practicing and teaching the practice of medicine, has been an attentive and patient observer. Fortunately for the cause of medical science, his observations have not been confined to those circumstances immediately connected with the diseases under investigation, but were extended to collateral inquiries, frequently quite remote, but yet having an important bearing upon the modifications of disease.

He was thus led, many years since, to investigate the geological characteristics of the immediate neighborhood of Cincinnati, and at a later period, those of the entire valley bounded upon the one side by the Atlantic, and on the other by the Rocky mountains, and known as the valley of the Mississippi, with especial reference to their effects, in the preservation of health and in the production of disease. The result of these observations clearly showed the important agency exerted by geological phenomena, in the modification of disease, at once curious and interesting, determining its character, fixing its type, and governing its action.

Beneath the soil covering the surface of this extensive valley, and which like that of the loose covering found elsewhere, consists of the debris formed by the accumulations from the disintegration of the subjacent rocks, and which presents characteristic differences dependent upon the rocky formation of which they are composed, beginning at the Gulf of Mexico, which is surrounded by broad and deep alluvial deposits, the valley rises towards the north, into a diluvial, and then into a tertiary formation. To this latter succeeds an extensive cretaceous deposit, extending into West Tennessee, followed by sandstone and shell, which in their turn are succeeded by transition limestone, and are finally terminated upon the north by pri-

mitive rocks. In all this arrangement "there is a geological, not less than a geographical, unity in the interior valley. Not the unity of a single formation existing every where, but the unity of one system of formations, deposited on a scale of vast extent, and subsequently subjected to the same influences, whether conservative or destructive. In no other country, over an equal area, is the geological structure, so simple and uniform, and in no other does it so decidedly constitute the whole into one natural region."*

The external configuration of this valley, presents in its water courses great dividing lines, which no less than the mountain ranges of other more strongly marked countries, serve to establish its various divisions. Thus, at the northeastern extremity of the valley within the United States, we find the Alleghany river taking its rise amid the Appalachian mountains in the state of New York, and pursuing a southwesterly direction, somewhat in the line of the great chain of lakes. The greater part, however, of the waters of the valley, after pursuing a southeasterly and southwesterly direction, as in the cases of the Missouri and Ohio rivers, find their way into the Gulf of Mexico, by means of the Mississippi river, which may be looked upon as the great outlet for the waters of the whole southern section of the valley which bears its name.

The medical topography of this region is as various as the difference in geological formation, subsequent deposits, and character of surface can render it, and consequently each separate locality has its peculiar topography, and its consequent diseases. Thus along the borders of the Mississippi river, are seen extensive alluvial deposits of great depth, reclaimed from the water, and terminated by bluffs. The most extensive of these is the American bottom, opposite St. Louis, in Illinois. This bottom has an average width of about five miles, and is nearly one hundred miles in length. This bottom consists generally of prairie, abounding in sloughs, ponds, lakes and bayous, which are filled in the spring, but become partially dry in midsummer and autumn, presenting a rank and luxuriant vegetation, to the influences most likely to generate miasma, and it is consequently peculiarly liable to autumnal intermittent and remittent fevers. A continued residence in the midst of malaria, has a tendency to render the inhabitants, to a certain degree, proof against its action in the form of fever, but they bear the evidences of its effects in their sallow and illy developed persons. Many of the inhabitants of this bottom are dwarfish and shrivelled, and are easily detected by their languid air, and sallow hue. The redemption from a watery dominion of this great alluvial region, "offers," says Dr. Drake, "to the engineer and the physician, problems in which the public have a deep and varied interest."

There can be no doubt that geological formation exercises an important

* Drake's Treatise, p. 28.

influence over disease. In proof of this, the reader of Dr. Drake's valuable treatise has but to compare the region of transition and secondary rocks, with the tertiary, in order to discover this influence, and to learn how intimately the geological character of a country is associated with its medical topography.

"In the region we have explored," says Dr. Drake, "it was found that as we advanced from south to north, there was a diminution in the prevalence of intermittent fever, which at the same time became more simple; there was also, but in a less degree, a diminished prevalence of remittent fever, and a gradually increasing tendency to assume a continued type. Although change of climate is a manifest cause of this modification, it is not, I presume, the only one, for we must also admit a telluric influence."

Another important agent in the modification of disease, which claimed the attention of Dr. Drake, was *climate*. In the interior valley, to which his investigations were confined, an extent of territory exists, which extends from the frigid zone upon the north, to the torrid zone upon the south, and which, consequently, contains every variety and modification of climate. But independent of mere latitude, there are a great variety of causes, which tend to produce decided alterations of climate in the valley of the Mississippi, among which may be mentioned its elevation above the level of the sea, the amount of its watery surface, and the presence of the Rocky mountains upon the west, and the Alleganys upon the east, bestowing upon it a complete intra-mountain temperature upon a vast scale. A large amount of information has been collected, but as yet, serious difficulties exist, in the absence of a sufficient series of long continued and extended observations, towards even an approximation to so difficult a subject, as the determining of the temperature of an extended and diversified country,

"In the west, from the cooling influences of the Cordilleras of Mexico, and the Rocky mountains, extending into the polar circle, and to the east, from a similar, though smaller, influence of the same kind, exerted by the Appalachian chain, from the latitude of 33° to 48° or 50° north, we know that the causes of equal mean temperature, cannot lie parallel to the lines of latitude, except for a certain distance in the middle of the valley, east of the Mississippi, as they approach the Appalachian mountains, they must bend to the south, west of that river, as they ascend the great inclined plane, they must curve in the same direction, and on reaching the Rocky mountains, must, of necessity, extend along their slopes, rising gradually, as the latitudes lessen, but not attaining the summits of these mountains, until we come within the tropics."

It is generally supposed that the settlement of a country, by clearing away its forests, and exposing a large portion of the surface of the earth to the influence of the sun's rays, has a decided influence in modifying its mean temperature, but such has not been the result in the valley of the Mississippi. On the contrary, it appears from thermometrical observations

extended through one-third of a century, during which there has been a large increase in its population, that no change has taken place in the mean temperature of this valley.

A much more important element in climate, than either mean temperature or extremes in temperature, considered in connection with disease, is *humidity.*

"In our climatic geography, there are five great regions, which may be presumed to differ widely from each other in their absolute quantities of atmospheric vapor, and also in the dew point complement. They are, *First*, the Gulf of Mexico; *Second*, the region west of the Mississippi river; *Third*, the regions east of that river, between the gulf and lakes; *Fourth*, the lakes themselves; *Fifth*, the Arctic regions. Let us consider them in succession.

"1st.—*The Region of the Gulf.*—The atmosphere resting over the gulf, and its coasts, and the estuaries and deltas of its rivers, is constantly near the point of saturation; although from its high temperature, a large amount of vapor is necessary to that condition. Thus, the mean annual temperature of the thirtieth parallel, is seventy degrees, at which point, the quantity of vapor, which, according to the table, is necessary to the saturation of a cubic foot of air, is 0.8693; while at the thirty-ninth parallel, where the mean annual heat is 53°, the amount of vapor required to saturate the same quantity of air is only 0.5074. Hence, around the gulf, there is not only an impregnation of the atmosphere, nearly up to the point of saturation, but the absolute quantity of vapor is great. The dew point is always high, and its complement small. In every season of the year, the loss of a few degrees of temperature, is sufficient to cause the condensation of vapor, and render the air moist. When the wind blows over the interior of the continent from the gulf, it brings with it this great amount of vapor; and coming into colder climates, which have a lower dew point, the atmosphere is at first made damp, then hazy, and at last rainy. During the winter, the heat of the gulf keeps up, while that of the inland regions becomes greatly reduced; and in the spring, the winds from the former have their vapor condensed in passing over the latter, and hence the copious rains of that season. At midsummer, currents from the gulf are still passing to the north; but the air over the continent is so hot, that it can receive and retain much of their vapor, in addition to what it already possesses. In autumn, the continental atmosphere is cooled, and then the southern currents send down, in the form of rain, a liberal quantity of their vapor. Hence, there are vernal and autumnal floods in our rivers. If the Gulf of Mexico were filled up, the winds from that region would have a high temperature, with a low dew point, and would shed upon the interior but little rain—the condensation from the difference of temperature, would not reach the dew point.

"2d.—*Region West of the Gulf and the Mississippi.*—The great inclined

plain west of these waters, stands in opposition to the region of the gulf. Its southern latitudes are as warm as those of the northern curve of the gulf; and even for ten or fifteen degrees further north, the summers are almost as hot as those of the latter region. The temperature is such as would admit of a high dew point; but the surface does not afford water for copious evaporation; and the air seldom approaches the state of saturation—is generally capable of receiving more vapor, and feels dry. The mountains to the west, are equally deficient in sources of vapor, and their low temperature causes the precipitation in the form of snow and frost, of so great a quantity, that the atmosphere over them has a dew point still lower than the atmosphere of the plain. When the winds of the gulf traverse that region, much of their vapor is required to bring its atmosphere to the point of saturation, and less is left to be precipitated in the form of rain or dew. On the eastern margin of the plain, near the Mississippi river, this is not the case, for the evaporation from the broad and watery trough of that river keeps up the atmospheric vapor; but on advancing toward the mountains, the quantity of vapor becomes so small, that it remains uncondensed during the minimum temperature of the summer night, and dew does not form. In autumn, however, when the temperature sinks still lower, saturation is reached, and vapor is then deposited in the form of hoar frost.

"These facts disclose to us the cause of the dryness, and the drying quality of our west and north-west winds. The absolute quantity of their vapor is small, much less than, at their temperature, they are capable of containing; and hence, when they roll over the eastern half of the valley, they take from it a large quantity of water. By the vulgar, their coldness is supposed to be the cause of their drying power, and hence they speak of freezing things dry; but if they came with the same small, absolute quantity of vapor, and had a high temperature, their drying power would be far greater. The winds which possess this power in the highest degree, are those which blow from a southern, sandy desert. They come with a low dew point, while their heat gives them a capacity for sustaining one much higher.

"3d.—*Region East of the Mississippi, between the Gulf and Lakes.*—The geological, hydrographical and botanical conditions of the region conspire in affording more vapor to the atmosphere, than the region beyond the Mississippi. The south-west winds which traverse it, come from the gulf, much oftener than those which traverse the more western plains. Finally, the north-east winds come almost saturated with vapor, afforded by David's Strait, the Gulf of St. Lawrence, and the northern Lakes. Under such circumstances, its atmosphere is of necessity more humid, has a higher dew point, and a complement of shorter range, than the region to the west of the Mississippi, between which and the region of the gulf, it may be regarded as holding an intermediate position.

"4th.—*Region of the Lakes.*—Here is abundance of water, but the temperature, compared with that of the gulf, is low; and the absolute quantity of atmospheric vapor is, of course, much less than along the shores of the gulf. Hygrometric observations have not yet determined the relative number of degrees in the dew point, of these two different regions, lying thirteen or fourteen degrees of latitude apart. At Toronto, the elastic force or tension of vapor, from observations every two hours for two years, was found to be 0.259 in., and the mean annual temperature for the same years was 44° 8. Now, by a reference to the table of tensions, we find that vapor of this temperature, when the air is saturated, has a tension of 0.313 in., showing that the atmosphere around the lakes, taking the year throughout, does not approach the dew point.

"At Hudson, nearly thirty miles south of lake Erie, Professor Loomis found the complement of the dew point for two years to be 8° 10′, while at Toronto it is about 5° 25′—difference 2° 85′, in favor of Hudson, which is what might be expected from their relations to the lakes.

"From the table of Professor Loomis, it appears that the month of April has the least vapor, compared with what, from its temperature, the atmosphere might contain. The complement of the dew point of that month, is 12° 80′; that of December, which has the least, is 4° 95′. Of the seasons, spring is the dryest, winter the most humid; summer and autumn are intermediate, and differ but little from each other. Two observations were made daily by Professor Loomis, one at nine, A. M., the other at three, P. M. The difference between them was, for the year, 5° 2′. The greatest difference was in spring—the least in winter.

"5th.—*Arctic Region.*—A reference to the general table of mean temperatures, and the table of this section, will show that the actual amount of vapor which can at any time exist in the atmosphere, within the polar circle, is very small. In the latitude of thirty degrees, where the mean temperature of the air is seventy degrees, it requires 0.8693 grains troy, to saturate a cubic foot of air. Under the fortieth parallel, which has a mean heat of fifty-one degrees, 0.4757 grains are required for saturation; at the seventieth degree of latitude, where the average annual is but five degrees, the required amount is only 0.0872 grains. In popular language, the vapor of the atmosphere is nearly frozen out. Still, in those regions, one of the chief inconveniences, experienced on shipboard in winter, was the humidity of the apartments. The atmosphere has no capacity for receiving the exhalations from the lungs and skin, which, being condensed against the walls, by re-evaporation, maintained the air at the dew point, while every thing without, had its moisture congealed and deposited. When the wind blows from that region, it does not, however, reach the more southern latitudes, in such destitution of vapor, for in traversing Hudson's bay, and a countless number of lakes, its temperature is raised, and it imbibes a great additional quantity of vapor."

The influence of moisture in the generation of miasm is well known, and in the late epidemic of Asiatic cholera, in the Mississippi valley, it was uniformly observed to linger about those places noted for their quantity of moisture, as the low damp situations by the sides of streams, or where the atmosphere was more highly charged than usual with aqueous vapor. Professor Davis, of Chicago, in an able paper on this subject, has given many conclusive proofs of the dependence of the spread of this fearful epidemic upon moisture, either contained in the atmosphere, incident to the position where the disease made its attack.

Apart from those circumstances produced by geological and climatological phenomena, there are physiological considerations, connected with the inhabitants themselves, which must not be lost sight of in an examination of this region. One of the most important of these physiological considerations, is the great diversity in the origin of the inhabitants, and the consequent diversity of their offspring by intermarriage, from which it follows, "that the world has never before witnessed such a commingling of races. Those of England and the Atlantic states, the most complete of modern times, bear no comparison with ours, and if we ascend to the earliest historic period, no case of equal complexity is met with. The Roman empire, it is true, was greatly compounded, it was, however, an assemblage of distinct nations, between which there was but little, and in many cases, no social nor even commercial intercourse. It was an aggregate, ours is a living compound, as yet in the forming stage. Three out of five varieties of the human species, with all the important races which belong to one—the Caucasian or overruling element—cannot fail in the end to give a new physiological and psychological development."*

But a small proportion of this voluminous work is devoted to the examination of particular diseases, and this is necessarily confined to the class of intermittent and remittent febrile affections. Dr. Drake has the materials for a second volume, which will be devoted to the examination of disease, which we hope will soon be placed before the medical public. In the meantime, the influence of the present work, cannot but be in the highest degree beneficial to the cause of medical science, and through it to that of humanity. If no other end is attained than that of drawing the attention of medical practitioners to these causes, which are silently operating in their midst, in modifying diseased action, and which have been hitherto too often overlooked, its great benefits can hardly be overestimated. No physician, and especially no country practitioner in the valley of the Mississippi, should be without this work. Its facts are carefully selected, its deductions accurately drawn, and an entire freedom from prejudice or preconceived theories characterizes the whole volume.

* Drake, p. 646.

Stricture of the Urethra, its Pathology and Treatment, comprising Observations on the Curative Powers of the Potassa Fusa in that Disease; with Cases. By ROBERT WADE, F. R. C. S. &c., 2d Edition. CHURCHILL, London, pp. 265.

As far as we know, John Hunter, the great originator of so many beneficent improvements in the treatment of surgical diseases, was the first to employ caustics in the treatment of stricture of the urethra. His first experimental applications were very rude, producing considerable imflammatory action along the course of the urethra; soon, however, his ingenuity suggested an instrument for the due application of the agent he wished to employ, and he continued to use it when occasions afforded. His pupil, Sir. E. Home, continued and improved upon his practice, using principally, if not solely, the nitrate of silver as his agent, at the same time a contemporary, Mr. Whately, used with great success the potassa fusa in very minute quantities, and without any ill effects. For some time the use of caustics to the strictured urethra flourished; but from some cause, (whether it was that the practice was abused we know not,) it was condemned and abandoned by the great surgeons of the last generation, both in England and France. Recently, thanks to the persevering energy and skillful management of Mr. Wade, the practice has revived, and in his hands, especially, has been pursued with a success which claims the thoughtful attention of every surgeon, when called upon to treat a hard cartilaginous stricture, which does not yield to treatment by bougies alone, or those irritable ones which so frequently, from the spasmodic action, induced during the passage of the bougie, are extremely difficult to manage, most especially, however, does Mr. Wade urge the treatment to potassa fusa in cases of impervious stricture, preferring that plan of treatment, and as we think, very justly to the much discussed operation of cutting into the urethra from the perineum, practiced by Mr. Syme, and followed by a few other surgeons, with very questionable results. The reader will find Mr. Wade's opinions, with regard to this operation, fully developed at the end of the book. Of the other methods employed in the treatment of severe strictures, we have no space to say more than that the stilette catheter of Stafford has still its advocates, although we believe that our hospitals can produce but few cases in which it has been employed of late years; its advantages are all attainable by the use of potassa fusa, whilst its disadvantages are avoided. The forcible rupture of the strictured portion of the urethra has also been revised of late, and may be performed by means of instruments invented by Mr. Thomas Wakley, with ease, and we believe safety, although from the limited time these instruments have been before the profession it would be unwise, at present, to do more than recommend a fair trial of them. We ourselves, however, have seen them used

by the inventor with marked success. Returning to our author, we cannot too highly applaud the clear and practical manner, in which he has described the cases, which will be beneficial by the potassa fusa, the method of its application, and the reasons he entertains for preferring this caustic to nitrate of silver, or any other, as well as to all other modes of treatment. We can confidently say, that there is nothing wanting in this treatise on stricture—no untoward event which is not anticipated, no species of stricture which is not discussed, and no kind of treatment which is not analyzed; whilst the principal feature, the reintroduction to practice of the potassa fusa, in an efficient and safe and practical manner, is worked out in the simplest, yet most comprehensive language. There is no bigotry in this volume; with a high and justifiable confidence in this plan of treatment, Mr. Wade rides no hobby, but gives due honor to, and himself employs the simple bougie and other modes of treatment with discriminating judgment. Many cases are given illustrative of the opinions put forth in the work, and of the practice pursued by Mr. Wade; from the perusal of which, those practitioners especially who have not the advantage of seeing hospital practice in large towns, will derive real practical information.

The Teeth and their Preservation. By Charles Vasey, Dentist, Renshaw, London.

The author having found that the teeth of many persons are in a measure neglected and destroyed, for the want of a little knowledge, was induced to publish the little work before us in a popular form.

The book is exceedingly well written, and conveys to the general reader, sound and judicious information upon the teeth.

The Physiology of the Teeth Properly applied to their Care and Preservation. By Joseph Snake. Second Edition. Loughman & Co., page 76.

Mr. Snake has long been favorably known in England, as the uncompromising enemy to dental quackery, he has been repeatedly engaged in giving popular lectures upon the science of the art, and the looseness of character of many of those who pretend to be professionals, therefore, in presenting a second edition of his little work to the public, he has done his brethren and the public good service—the subjects are all scientifically and judiciously treated, particularily that when giving advice upon the insertion of artificial teeth, he observes, "the difficulties to be overcome, differ almost in every case; but whatever character they may assume, the above shows how necessary it is that the mouth should be rendered perfectly healthy, before an artificial restoration can be either permanently comfortable or beneficial.

Practical Observations on the Teeth, designed for Popular Use. BY HENRY JORDAN. LONDON, Highley, pages 104, octavo.

THE author has dictated his treatise to Mr. Bell, but in publishing this work for popular use, does not claim any originality, as regards discoveries in the science of dental surgery, but states that the principles he advocates and wishes to propagate in the minds of his readers, are those now generally received and acted upon by the scientific dentist, consequently the work itself is not intended for the instruction of the profession: he observes, "the scientific practitioner has nothing to gain by making a secret of the principles of his art, and can well afford to leave all mystery in connection with it, to those who live by empiricism; and whilst the public remain quite unprotected in any other way from the extravagant pretensions of the unscrupulous character, it is certainly most important that every aid should be afforded them of judging between such persons, and those who practice their profession in a just and scientific manner." In the above remarks, we most cordially agree with our author, and trust many similar works, propagating the same judicious advice, &c., will be given to the public, it will be by these means, the public will become enlightened, and protected against the gross fraud, and impositions practiced upon them.

Passing over the author's quotation, from an "elegant writer," we notice he advocates the use of the forceps for the extraction of teeth, and observes, "Although Mr. Clendon *may* not have been the first to use the *adapted* forceps, which he recommends, to him, at least, belongs the merit of having directed the attention of the profesion and the public to this subject, in such a manner, as more than anything else must have tended to the general conviction of the unsuitableness of the key, and the great superiority of properly constructed forceps, for extracting the teeth. Mr. Jordain, is evidently unacquainted with the fact, that to Mr. Tomes belongs the merit of having drawn public attention to adjusted forceps, he having published in the *Medical Gazette,* a description, with drawings, two or three years previous to the appearance of Clendon's work; we mention this fact, that in case the author should again have occasion for a reprint, we feel assured an opportunity has been given him to correct this error. He is thoroughly opposed to the use of anæsthetic agents in the extraction of teeth, and strangely enough follows in the wake of previous authors who have opposed their introduction for this purpose: he says "in the unconscious state, induced by the inhalation of these vapors, it is not always possible to get the mouth in the most favorable position, especially for extracting the grinding teeth of the lower jaw. The mouth is also very often rigidly closed, and though it may be *generally easily* opened,

the assistance of a *second* person is often necessary to keep it so; this necessarily impedes the view, and forms an obstacle to the exact adjustment of the instrument. In the extraction of the back teeth, a half-closed state of the mouth, will often effectually prevent the proper elevation or depression of the handle of the forceps, so as to enable the operator to use it at the proper angle, and thus the power cannot be applied in the right direction, and a greater amount of force is consequently necessary to remove the tooth, and there is great danger of its being fractured.

Thus I think the use of anæsthetic agents in the extraction of teeth, tends to complicate the operation, and for the sake of the *uncertain* expectation of saving a moment's pain, a great amount of risk is incurred of rendering it unsuccessful. On these accounts, I have now entirely laid them aside, and though they may still be used by some few, I believe that dentists generally will be found to condemn their employment.

Our author and us have journeyed together, and enjoyed each other's company, up to this point. We never criticise closely or severely young authors, who write popular works for their own and the public good; simply, that if the *matter* be tolerably well sifted, a little chaff, in a *local* district, will do no harm. Upon principle, however, we must put our veto against the sweeping assertions of our author, when he says, "the use of anæsthetic agents, tends to complicate the operation of the extraction of teeth, he must surely mean that *experience* and *time*, are the essentials, not the difficulty in managing the position of the patient's head; the rigidity of the muscles, will, as a matter of course, depend upon the length of *time* and the *experience* of the operator, in administering his agent, to enable him to open the patient's mouth; he must not quarrel with the agent, he must look closer at home, and become thoroughly experienced in its administration and effects, before he ventures to condemn the greatest blessing ever given to relieve suffering humanity; experience and time will convince Mr. Jordain, that he has "popularly" treated a subject he does not at *present* understand, or *his* patients permitted to reap the benefit.

With these exceptions, we heartily recommend this work to our non-professional readers, as containing a large amount of the best advice upon the preservation of the teeth. R.

The Transactions of the American Medical Association.—Vol. IV., pp. 677.

This volume is the fourth one issued by the American Medical Association, and as a whole, is superior to either of its predecessors. The reports are all prepared with care, but we greatly prefer the divisibility of labor adopted at the last meeting of the association, which cannot fail to elicit a larger amount of valuable information, than could have resulted from the

former organization of the committees. The chief defect in most of the reports of the committees of the association, is to be found in the vastness of the field occupied, and the comparatively slender tillage bestowed upon any particular part of it. The committees were not so much to blame for this defect, as the organization under which their reports were made. Generalities were absolutely necessary, and the limited nature of the reports precluded a careful and minute analysis of these generalities. The twenty-seven committees appointed to investigate particular subjects, are free from this objection, and are not expected to embrace a comprehensive field of inquiry. But while their investigations are necessarily limited, it is to be hoped that they will be thorough.

The association has assumed a position, which, so far as human foresight can penetrate, is likely to ensure to it a long career of usefulness. Without high sounding pretensions, or vain boasts, it has already manifested by its works, its great capacity for the advancement of the best interests of the medical profession. We may have occasion to refer again to this volume, and in the meantime, we would recommend it to our readers as well worthy of their perusal. The prize essay, by Dr. Dalton, is highly creditable to the author as well as to the association.

Eighth Report to the Legislature of Massachusetts, relating to the Registry and Returns of Births, Marriages and Deaths, in the Commonwealth, from May 1, 1848, *to January* 1, 1850. By Amasa Walker, *Secretary of the Commonwealth,* pp. 130.

The state of Massachusetts has obtained the proud position of being the foremost one in the Union in sanitary investigations. The present volume, which exhibits a large amount of valuable statistical information, is the eighth prepared under the auspices of the state. Although it is issued under the name of the Secretary of the Commonwealth, yet that functionary, in presenting it to the legislature, says that he found, on entering office, that his "predecessor had employed Dr. Josiah Curtis, of this city, (Boston,) to make out this report from the returns received by him, and under his supervision, it has been completed."

To Dr. Curtis, then, rather than to the Secretary of State, are we to look for the authorship of this report, and we are happy to say that it could not have been confided to more able hands. Dr. Curtis, who is yet young in his profession, greatly distinguished himself by his report on the sanitary condition of Massachusetts, made to the American Medical Association, as a member of the Committee on Public Hygiene, at a time

when Dr. Wynne was the chairman of that committee, and Professors Yandell and Harrison, and Drs. Parrish and Gaillard were his colleagues.

In the present report, the tables are prepared with great care, and embrace a variety of useful information, and the conclusions drawn from them, are presented with great precision and force of language.

Address delivered before the Pennsylvania Society of Dental Surgeons, at Sansom Street Hall, Philadelphia, October 10th, 1851. By ELISHA TOWNSEND, D. D. S., etc. etc., pp. 40.

WE cannot give a better idea of the general scope of the above address, than by quoting a few passages from it. After stating the objects of the society, before which it was delivered, the author says:

"Individual improvement in the knowledge of our profession, and the advancement of the profession itself, thus recognised and provided for by our association, are alike obligatory upon us, whether we would acquit ourselves worthily towards our patients in private practice, or discharge the implied obligations which we owe to the community and to the world: and happily, these aims, and the means of accomplishing them are in all particulars, either identical or mutually helpful. The lower and narrower interests of individuals and communities may clash with each other, but the higher and nobler, grow more liberal, consistent and harmonious as they rise in dignity and value. It is the appetites that squabble over their prey; the moral sentiments ever co-operate and harmonize in all their movements. This principle is so true in all possible applications, that we may safely carry it with us for criticism and direction throughout the whole region of speculation and practice.

"The methods or agencies of this improvement of the individual, including both practitioner and pupil, and the necessary advancement of the science which they are bound to carry forward with them, I propose now to consider; and for this purpose I suggest, that the questions of Dental Societies, Dental Colleges, and the reactive effect of that public opinion which they have the power to create, afford the best division and array of the points to be discussed. These are subjects of special interest at the present juncture of our profession's misfortunes; and our opinions and actions upon them are of great moment to its welfare.

"But a little while ago, the student of dentistry caught up the scattered hints of theory, and occasional directions in practice, then accessible, as he best could. It was a mere matter of good fortune to meet with the right method and man in his need, and his attainments in the art depended so much upon his own discoveries, and so little upon his tuition proper, that the idea of self-made dentists and self dependence in the pursuit of improvement very naturally got a strong hold in the minds of some of our best men, and still keeps its place there with all the tenacity of a prejudice based upon experience. Self-dependence and self-development are fundamental truths indeed, but the notions of them, gained when they were the sole reliance for attainment, or nearly so, must not be carried forward into the changed circumstances to which they no longer apply.

"The stout hearts and good heads of that day, made noble achievements in the field of discovery and reform, and acquired much that now asks better *methods* of teaching, than sufficed before the business of dentistry had grown into a collection of scientific facts and principles, rich and full, for its own uses, as any other branch of the healing art.

"Professions, like individuals, walk and run by the same self-moving forces with which they crept, but very differently exerted and arrayed, and in a very different attitude to objects, guides and helps—I mean here to say, that we stand in the present, with our faces towards the future; and as experience is not the measure of our hopes, so its formulas must not limit or prescribe our aims and methods, nor must its authority be allowed to control or curb our liberties. When men talk of experience as the test of truth, they should be careful not to confine the thought to *past* experience *wholly*; there is a *future* experience, whose office it is to try the ideas of to-day, and it is its office, too, to enlarge the partial truth of yesterday, into wider views, and to correct the old fact by that fuller truth which is to serve the world's turn to-morrow."

On the subject of association, Dr. Townsend remarks:

"The principle of association holds as well in the cultivation of professional learning, as in any other matter of human action, which can be helped by mutuality of communication, and reciprocity of service. The objects of the great endeavor have such variety of character, and each has such diversity of aspects and relations, as require the greatest variety of minds and conditions in the observers for their thorough investigation; especially, during the earlier periods of development, while new facts are in demand and new views of old facts are required, for the adjustment and harmony of the whole; most especially, while a science is just rounding into form, does it demand, not only the services, but the united services of every grade of attainment and every order of mind that exists among its cultivators. Of a hundred men, ranking on the same general level of reputation and real worth, who may conduct their investigations separately, no two shall see any one thing in all particulars, alike, or consider any one subject, under exactly the same aspects, though each shall observe and consider it justly, in the partial view he takes of it. Whoever has looked into this matter, knows, that theories, investigations and processes, both mental and manual, conducted by the best minds alone, are almost sure to include elements not essential, and to overlook or miscalulate others most material to the issue—faults which far inferior minds, that happen to be free from disturbing prepossessions, can easily correct. And when we add to all, the difference of original capacity and individual influences, the equally great difference of opportunity, which the varied condition of a great number of men actively engaged in professional practice affords, the importance of free communication and mutual correction, to accuracy and completeness of knowledge, appears in a most imposing light. As to the means of this indispensable interchange of thought and discovery, after allowing their due importance and place to books and periodicals, other and most important uses are found to belong appropriately to the method by personal intercourse in deliberative and polemical assemblies of adepts. However adequate the press might appear, at first sight, to supply all this need, the popular measures for the exchange of knowledge which are now in general use, are in proof of the superior availability of oral discussion in certain respects of very high value. The gravest, most recondite, and the oldest scientifie societies, are now employing conventions and stated assemblies for the cultivation of their respective departments of study, and the early dissemination of discovery.

"There is something in the necessities of professional movements which it is felt associated action can best answer, or otherwise, the libraries accumulating through centuries, and the periodicals numerous and able as can be wished, and the first class daily papers, served by phonography and the telegraph, would fully answer the need, and spare the expense of toil and travel which is everywhere encountered in this method of prosecuting scientific improvement. Without attempting a complete list, or even intending a formal array, I need but refer for instances, to such bodies as the American Society of Physicians and Surgeons, the American Association for the advancement of Science, the Academy of Natural Sciences of Philadelphia, the Boston Society of Natural History, the American Association for the advancement of Education, the College of Teachers, embracing the active educators of the great Mississippi Valley, the American Society of Dental Surgeons, and such local and state societies as our own. These, a few of many, show that the cultivators of the sciences, the practitioners of the learned professions, who feel the necessity of a forward movement, and the friends of general education, are all using the method of personal conference, discussion and oral communication, on some common and clear perception of its peculiar advantages, and of its remunerating value in the service of general learning. Even in the membership of the few societies here named, might be found, perhaps, the names of all the men in our country known to fame, and deserving it by valuable services to the highest interests of the world; especially noteworthy is it, that the men who are the accredited authorities of the day, are found most punctual and active in these parliaments of progress. In the morning newspapers we meet the names, and brief exhibits of the last best ideas, of the very men whose works are the gems of our libraries. Naturalists, the medical faculty in all its specialities, the educators in general literature, from the common school to the oldest colleges; teachers of the deaf and dumb, and superintendants of insane asylums; with I know not how many more divisions of the great army of occupation and advance, are *our* warranty for the necessity and utility of such voluntary associations as ours, so far as the highest example can assure opinion, and support the resulting practice. I might safely rest my point here, and let the demonstration, afforded by universal assent, make its appeal to our brethren in the dental profession, for their active co-operation in this mode of individual and mutual improvement, and I do so rest it, none the less that I also appeal to the great *principle* of association, which underlies all experience of its excellent policy, in order that any imagined difference of conditions and interests belonging to any particular profession may be met and obviated. So far as the argument respects our own profession, I think I should be specially warranted in turning short upon opposition and indifference, with the answer, that it is not for men whose elementary studies and every day observation teaches them the sympathies that link the various organs and functions of the human body into unity and harmony, it is not for them to dispute, or to doubt, or neglect, the dependence of every difference of endowment, and the mutuality of all diversity of office, which relates to one system, and ministers to one end. This admirable contexture of multiform organisms, which we call our body, and by which we are related to the universe, and through which we govern the material world, is indeed the best, if not the only perfect type of a church fraternity, or circle society of men. The great apostle of the Gentiles recognises this truth, and makes his own characteristic use of it, in this nervous language, 'we are many, yet but one body. If one member suffer, all the members suffer with it, or

if one member be honored, all the members rejoice with it.' The anatomical and physiological facts in the human constitution, to which this bold figure of speech refers, are familiar to the men whom I now address, and it only asks a moment's reflection to feel their application to groups and aggregates of men, as clear as they are in the individual man, whence their force is borrowed."

If space permitted, we would copy several other pages from this able and beautifully written address; indeed, we would be glad to publish it entire, feeling assured that its perusal would give our readers as much pleasure as we derived from reading it, but we have already quoted so much that we have not room for the comments which we had designed making. A very good idea, however, of the general scope of the address, may be formed from the passages which we have quoted, and of the ability displayed by the author, in the management of his subjects.

EDITORIAL DEPARTMENT.

Attachment of Single Teeth to a Plate, by means of a Silicious Composition.—The readers of the Journal are all, doubtless, aware that a method, similar to that which has been occasionally practiced in France, for the last twenty-five or thirty years, for attaching single porcelain teeth to a metallic base, and the construction of artificial gums, has recently been introduced into practice in the United States. Several beautiful specimens of teeth, with artificial gums attached to plates by this means, have been sent to us by Dr. Wm. M. Hunter, of Cincinnati, Ohio, who, as is conclusively proven by documentary evidence in our possession, has been engaged in experimenting with a view to the discovery of a silicious composition for the accomplishment of this object, for some four or five years, and that his labors had been measurably crowned with success, as early as eighteen hundred and forty-nine or fifty. We have also seen a double set of teeth, with artificial gums, made by Dr. H., and attached to plates in this way, which had been worn for some time.

It also appears from evidence of the same kind, placed in our hands, that Professor J. Allen, of the same city, has been, for several years, conducting a similar series of experiments, and that they, likewise, have been crowned with the most satisfactory results. It having been stated that Professor Allen obtained the knowledge of the composition which he employs for the purpose, from a German, by the name of Steemer, affidavits

have been placed in our possession, which show the allegation to be unfounded.

We have not, as yet, had an opportunity of seeing any teeth which had been mounted with Prof. A's composition, and consequently are unable to judge of the relative merits of his and Dr. Hunter's, but we have been informed that he exhibited several very beautiful specimens to the American Society of Dental Surgeons, at the meeting held in August, 1851, for which courtesy, a resolution of thanks was passed. It will also be seen by the proceedings of the Mississippi Valley Association, of Dental Surgeons, that a report recommending it to the profession, was adopted by that body, at a meeting held in Louisville, Ky., September, 1851.

With regard to the practicability of uniting American or English porcelain teeth to a metallic base, with a silicious composition, independently of any other means of attachment, and so securely as to prevent the liability of their being broken off, by mastication, we confess we have our doubts. Any composition of this sort, which will fuse at a lower temperature than that required for the fusion of the teeth themselves, must necessarily be very brittle and incapable of enduring, for any considerable length of time, we would suppose, the mechanical action to which artificial teeth are subjected. We may be mistaken, and we hope we are, but until the fact is established by practical tests, we cannot believe differently. The French porcelain teeth, less beautiful and less natural in appearance than the American and English, are capable of enduring, without injury, a much higher heat, and consequently may be united to a platina base with a composition fusible at a much higher temperature even, than that required for the fusion of the paste employed in the body of American and English mineral teeth. With such a composition, teeth may be so securely united to a *platina* base, as to preclude the liability of their being broken off by any force or action to which a dental substitute is necessarily subjected.

But, irrespective of any advantage which might be derived from a composition of this sort, as a connecting medium between the teeth and plate, we have no doubt it will prove of great practical value for the construction of artificial gums and for filling the interstices between teeth mounted in the ordinary way, and the bases upon which they are placed. This, we believe, is all that Dr. Hunter proposes to accomplish by it, though Professor Allen, from the experiments which he has made, seems sanguine in the belief that teeth can be substantially united to a plate by it.

The idea of uniting porcelain teeth to a metallic base, did not, as we have already intimated, originate in this country. The credit of that, and indeed, the discovery of a composition by which it could be done, belongs to France, the earliest nursery of modern dentistry; and, however far the United States may have outstripped other countries, within the last quarter of a century, in perfecting the practice of the dental specialty of

medicine, we would not lay claim to the honor of a single discovery to which we are not justly entitled. But the composition employed in France, cannot be used in connection with teeth composed wholly, or nearly so, of spar and silex, and for the discovery of one, applicable to teeth of this kind, we believe the credit to be due to American dentists; and, so far as our information upon the subject extends, to Drs. Hunter and Allen. At any rate, the efforts of both seem to have been crowned with success. To which the priority of discovery of right belongs, we leave others to decide. It is claimed by both, and it is to be regretted that it should have given rise to the misunderstanding which seems to have grown out of it, between these gentlemen. If they cannot consent to share the honor of the discovery, and the gratitude of the profession, if it shall prove a really valuable discovery, after having been submitted to the severest practical tests, we would suggest that they lay aside all personal ill will, if they have any, towards each other, and submit their respective claims to priority in the matter, together with all the facts and evidence which may be calculated to throw light upon the subject, to friendly arbitration, by disinterested individuals, each pledging himself to abide by the decision. If the matter in dispute could be amicably adjusted in this way, it would be better for both. Private misunderstandings and quarrels are seldom productive of good, and it rarely happens that any, except the parties immediately concerned, and perhaps a few personal friends, feel much interest in such matters. After the claim to priority in the matter shall have been settled, we would then suggest that each give his discovery to the profession, charging only a reasonable fee to such as may desire personal instruction, and if it shall more than compensate for any indebtedness incurred for knowledge which he may have gained from the labors of others, the balance, we feel assured, will be more than liquidated by the gratitude of his brethren.

Philadelphia College of Dentistry.—Under a charter, granted by the legislature of Pennsylvania, for a college of Dentistry at Philadelphia, a faculty was elected on the 17th of October, 1851, composed of five professors, namely:

J. D. White, M. D., Professor of Anatomy and Physiology.

Ely Parry, M. D., Professor of Dental Chemistry, Therapeutics and Materia Medica.

Elisha Townsend, D. D. S., Professor of Operative Dentistry and Dental Hygiene.

Robt. Arthur, D. D. S., Professor of Principles and Practice of Dental Surgery.

J. L. Buckingham, Professor of Mechanical Dentistry.

Most of the above named gentlemen are known to the profession as men of ability, and all, we doubt not, are well qualified to discharge the duties respectively assigned to them. The first course of instruction, we understand, will commence next fall, and, under the auspices of so able a faculty, even though it may require years of gratuitous labor, we cannot doubt but that the enterprise will ultimately be crowned with success. It will probably require some twelve or fifteen years, to effect a sufficient change in public opinion to render it necessary, that those to whom the management of the diseases of the mouth is committed, shall have been properly educated for the business, but this change will certainly take place; it has already commenced, and when it shall have become general, the number of dental students who will then avail themselves of collegiate instruction will be sufficient to remunerate, moderately at least, the teachers of three or four schools in the United States. We say this, that those who have recently become interested in furnishing facilities for instruction in dental surgery may not become discouraged, but that they may look rather to the elevation of the standard of professional qualification, than immediate pecuniary reward. We hail the establishment of every new college of dental surgery as an indication of the rapid progress of the change to which we have referred; and most cordially do we tender to the professors composing the faculty of the one in Philadelphia, our best wishes for their success, hoping the day may not be distant, when they will reap a rich reward for the labors in which they are about to engage.

New York College of Dental Surgery.—We learn from the Announcement of the First Course of Lectures, recently received, that a college, under the above designation, has been instituted, at Syracuse, New York, with five professorships and one demonstratorship, and to which the following appointments have been made:

A. Westcott, M. D., D. D. S., Professor of the Theory and Practice of Dental Surgery and Dental Technology.

The chair of Institutes of Dentistry, Dental Hygiene, and Comparative Dental Anatomy, has not yet been filled.

A. B. Shipman, M. D., Professor of Anatomy and Physiology, and General Principles of Surgery.

Thomas Spencer, M. D, Professor of Special Pathology and Therapeutics.

R. F. Stevens, M. D., Professor of Chemistry.

Daniel Van Denburgh, D. D. S., Demonstrator of Mechanical and Surgical Dentistry.

The first course of lectures commenced on the first Monday in December, 1851, and will continue fifteen weeks. The duties of the vacant

chair, will, we understand, be performed, until it is filled, by professor Westcott. With regard to the number in the class of the present session we are ignorant, though we were informed by a friend that it was expected there would be about thirty in attendance. We hope the friends of the school may realize their most ardent anticipations in the enterprize.

Another College of Dental Surgery Contemplated.—In a series of spiritedly written articles, published in a Nashville paper, the peculiar advantages of that location for a school of dentistry, are ably urged by Dr. B. Wood, surgeon dentist. Although it would give us pleasure to see a college of dental surgery in successful operation in Tennessee, we fear the undertaking would not, at present, meet with sufficient encouragement to justify men, properly qualified as teachers, in devoting the necessary amount of time and labor to the subject. We admire the enthusiasm and ardent desire for the elevation of the profession, manifested by the writer of these articles, and most sincerely do we wish the attainment of the object contemplated by them, were possible, but with our knowledge of the profession in the United States, together with the experience we have had in teaching, we believe it would require fifteen years of unremitting labor to secure a class of fifteen students. We do not say this to discourage the praiseworthy and commendable efforts of Dr. Wood, but because we fear that, if a school of dentistry were established in Nashville, at this time, sufficiently large classes could not be drawn together to justify the continuance of the labors of those who might become associated in the enterprize. Until the colleges of dental surgery now in existence in the United States are better sustained, we are inclined to doubt the propriety, and we are not influenced in the expression of this opinion, by any unkind or selfish motive, of establishing others.

Collegiate instruction in dental surgery is a new thing, and although the experiment has been sufficiently tested to convince those who have carefully examined the matter, that it will ultimately become indispensable, yet it will be some time before that period arrives. When it does come, the enterprise of American dentists, will not long permit the want to remain unsupplied.

Gutta Percha as a Base for Artificial Teeth.—We have received a communication from Robert Parsons, surgeon dentist, of York, England, informing us that a Mr. Turner had obtained a patent for "fixing artificial teeth upon a preparation of gutta percha." He also states that he has a set in his possession, the entire base of which is composed of the same

material, which had been worn for some time, and made by his brother Mr. J. H. Parsons, dentist, of Halifax, who had made others during his residence at Liverpool. He does not, however, regard this material as suitable for the purpose, and says, "it can never supercede well adapted gold plates, or carefully sea horse ivory foundations."

Some six or eight months previously to the receipt of the communication here referred to, we received a letter from a professional gentleman residing in New England, who informed us that he had succeeded in making a preparation of gutta percha which he had used as a base for artificial teeth. He also informed us that in the cases in which he had used it, it had fully realized his most sanguine expectations, promising that after he should have tested it sufficiently, and if it should prove to be really valuable for this purpose, to make the discovery known to the profession. He moreover sent us a small piece of the preparation, and, we believe, he is still engaged in trying to improve it. We hope he will soon give us an opportunity of laying the results of his experiments before the profession.

Dr. G. W. Parmly.—We have recently had the pleasure of a visit from Dr. G. W. Parmly, dentist to the Royal Family at the Hague, and son of Dr. L. S. Parmly, of New Orleans. After an absence of six years, he has returned to visit his friends in the United States, and although he still holds his appointment abroad, we trust he may be induced to resign it, and resume his practice in New Orleans. We do not like to part with so good a dentist, even though it be to minister to the wants of royalty. We trust that ere long, Dr. P. will favor us with an opportunity of giving our readers the result of his observations on the state of the dental profession in Europe.

Comparative Anatomy of the Teeth.—With the present number of the Journal, we commence the republication from the Encyclopedia of Anatomy and Physiology, the article by Professor Owen, on the Comparative Anatomy of the Teeth. The wood engravings with which it is illustrated, made by Mr. Johnson of Baltimore, will, for neatness of execution, we think, compare with the original. The ability and profound research exhibited in the preparation of the article by the distinguished author, will secure for it from the more scientific of our readers, we feel well assured, an attentive perusal.

Dr. C. G. Davis, a graduate of the Baltimore College of Dental Surgery, and formerly of Sippican, Mass., has recently removed to New Bedford, Mass., a place which opens to him a larger field for the exercise of his fine professional abilities. Dr. D. is devotedly attached to his profession, and urged on by an ambition that will not permit him to rest satisfied with mediocrity of attainment, we feel assured his merits as a practitioner will not remain long unappreciated by the citizens of the place of which he has now become a resident.

Sponge Gold.—In the October number of the Journal, for 1850, we took occasion to call the attention of our readers to a new preparation of gold for filling teeth, and in the first number of the second volume of our New Series, we copied from the *London Medical Gazette*, an article, written by Mr. Tomes, Surgeon Dentist to the Middlesex Hospital, in which was described two forms of gold, made by Mr. Makins, which he had employed with the most satisfactory results. Wishing to try these new preparations, we sent to Mr. Ash, of London, for a small quantity, some of which, he at once forwarded to us by express. But as it does not correspond in appearance, with either of the preparations described by Mr. Tomes, as having been made by Mr. Makins, we fear he has sent, through mistake, another description of gold, one also referred to by Mr. Tomes. It consists of small irregular masses, of a porous texture, and of a light brown color, which are readily broken down into powder by pressure. These, however, and even the powder, are susceptible of being compressed into a solid mass. The experiments which we have made in filling teeth with it, have convinced us that a good filling can be made with it. Its use, however, for this purpose, is attended with considerable difficulty, in filling a cavity in the approximal surface of a tooth, and, indeed, in filling a cavity in any part of a tooth in the upper jaw, in consequence of its tendency to crumble and escape into the mouth, before sufficient pressure can be applied to weld the particles together. This difficulty may be measurably overcome by wrapping gold foil around it, in the manner as suggested by Mr. Tomes. In this way, it may be very conveniently employed for filling large cavities in the grinding surfaces of the molar teeth, in either jaw, but for small cavities and cavities in the sides of teeth, it cannot be used as satisfactorily as gold foil, inasmuch as the envelope is liable to be perforated and broken before the contents are forced into the cavity, and the particles welded together.

This preparation of gold, however, may, in locations where it can be advantageously employed, be made to adapt itself to all the inequalities of the cavity, and when properly condensed, if the tooth be broken, it will

come out in a solid mass, requiring considerable force to break it. The angles will be found to be sharp and more resisting than a filling of foil. When broken, the fracture presents a frosted appearance, as does also the sides which were in contact with the walls of the cavity, while the surface is the color of gold, and is susceptible of a very fine and beautiful finish.

So far as we have tried this preparation, we think it preferable to the one made in New York, but, without great improvement, it can never be made to take the place wholly of gold foil, though there may be some cases, perhaps, in which it can be used more advantageously. As soon as we can have some prepared, we intend to try the precipitated leaf and sponge, recommended by Mr. Tomes, and when we shall have done so, we will make our readers acquainted with the result.

A New Article for Drying Cavities in Teeth, preparatory to Filling.—In a communication recently received from Dr. Alphonso Severence, dentist, of Great Falls, N. H., the use of what is known by the name of "*flax cotton*," is recommended as superior to any other substance for absorbing the moisture from cavities in teeth preparatory to filling. The Dr. sent us a small quantity with a request that we would give it a trial. We have done so, and find it to be a most admirable article for the purpose. It is easily applied to every part of the cavity on the point of an excavator, and absorbs the moisture more readily than unprepared raw cotton, and can be more conveniently employed than tissue paper—an article much used of late, by many dentists.

Errata.—On page 61 of last number of the Journal, line 29, for "uncommon," read, common. On page 67, line 17, for "as successful," read, a successful. Page 68, 1st line, for "with shining," read, by ruining.

The late Mr. Durance George.—It is with feelings of regret we announce the premature death of this distinguished and accomplished dentist, at his residence, Old Burlington Street, London.

Mr. George was nephew to the veteran Cartwright, and prosecuted his studies at the London University as a surgeon—upon the anticipated retirement of his uncle, he abandoned general surgery and commenced his studies by familiarizing himself with the labors of the work bench, under

the able tuition of the late Mr. Sherwin. After devoting some time to this branch, he commenced his career as an assistant to Mr. Cartwright, and upon his retirement he succeeded to the practice. Even at this early period he began to be known and appreciated in dental practice, for in the autumn of the year 1843, he was requested to deliver a course of lectures on physiology and diseases of the teeth, at the Theatre adjoining St. George's Hospital; the following year the University College appointed him to the professorship of dental surgery. The lectures were distinct, comprehensive and well arranged—embodying all the objects usually contained in such a course—not confining himself to the mechanical, surgical and operative treatment of the dental organs; he arranged a mass of information on their pathological relations, and morbid anatomy, illustrating important points by means of a collection of diagrams, drawings and models of the best kind. As a lecturer, Mr. George's manner was unembarrassed, his language fluent and well selected, his arrangement clear and comprehensive, while he introduced any novel or important facts by modestly avowing that the opinions he advanced were not his alone, but supported by the sanction of men much older, and experienced in the profession. As a physiologist, Mr. George stood deservedly high, at the same time, he displayed great mechanical ingenuity in the practical treatment of the dental organs.

As a private man, his manners are said to have been courteous and gentlemanly—whilst, with the liberality accompanying real merit, he imparted the results of his professional experience to his less fortunate brethren, without hesitation or professional jealousy, and thus secured to himself a large circle of professional friends. Mr. George had been ailing for the last two or three years, but his most intimate friends did not anticipate any serious danger, but considered by relaxation from professional fatigues he would ultimately recover—it was only within a month or so previous to his death, they were aware of his dangerous condition—and as the time approached for delivering his introductory lecture at the college, it was postponed in consequence of his indisposition. After a few days, he delivered his lecture with evident signs of physical and mental sufferings, and apologized to his class for the previous dissappointment, and his present want of physical power to do justice to the subject—but announced to his pupils the day and hour he should commence the course—upon the pupils assembling, they learnt the alarming state their professor was in, and no hopes entertained of his ultimate recovery. On the 20th of November, four days after his introductory lecture, this distinguished and accomplished dental practitioner ended his earthly career at the early age of thirty-six—in the prime of life, with his intellectual faculties full of vigor—but the physical, worn and injured by over exertion and devoted attachment to his profession.

R.

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ARTICLE I.

Treatment of Dental Caries, Complicated with Disorders of the Pulp and Peridental Membrane. By ROBERT ARTHUR, D. D. S.

NO. IV.

In the last number of this series of papers, I considered those cases in which the caries had not yet progressed so far as to deprive the pulp of any part of its bony covering, but had approached so nearly to this part of the tooth as either to exercise an injurious influence upon it, or to render it liable to become exposed in the course of the performance of the ordinary operations for the arrest of this disease. Considering it of great importance to preserve the pulp alive, and in healthy condition, I advised and indicated such a course of treatment as, in my estimation, would enable this object to be accomplished.

I come now to the consideration of those cases in which the pulp is actually laid bare, and the affected tooth, in such condition, that a filling inserted in the ordinary way, without previous preparation or unusual precaution, or even in the manner directed in the last number, alluded to above, would give rise to painful symptoms and injurious consequences.

To avoid circumlocution, I shall say, that in this condition the pulp is exposed: by which term, I mean what, indeed, is generally understood both in and out of the profession, that the pulp is, to some extent, deprived of its bony covering.

The propriety of treating teeth after the pulp may have become exposed, with any view to their permanent preservation, has long been questioned. Doubts have always been entertained of the feasibility of saving the pulp alive after it is once exposed: and it has been repeatedly asserted, that any attempt to save a tooth after the "nerve" had been "destroyed," would be sure eventually to result in injury to the patient. It was alleged that, when the pulp loses its vitality, the entire tooth is "dead," and that nature, from that time forth, would make unceasing efforts to get rid of it, and that it would ultimately be expelled from the jaw. It will not be necessary to waste time in showing, at any great length, the fallaciousness of this opinion, for a large majority of the most intelligent dental practitioners of the present day, agree that teeth may be preserved for many years after having been deprived of their pulps. It may be well, however, for the benefit of those who are just coming into the profession, to take some notice of these objections: this I shall do in few words.

The teeth, it is well known, derive their supply of blood-vessels, nerves, &c. from two sources, viz. from the investing membrane of the root, and from the pulp occupying the internal cavity. By far the more important of the two is the former; indeed, a highly intelligent member of the profession (Dr. Trenor, of New York,) contended, some years ago, that the teeth are entirely dependent upon the peridental membrane for nourishment, and that the pulp is of no particular value after it has fulfilled its office of forming the tooth. In support of this view, he stated that he had seen teeth from which the pulps had been removed and filled, by Dr. Hudson, which had remained as good and useful as any of the rest of the teeth for ten, fifteen, and twenty years. Whatever may be the amount of truth in the position taken by the gentleman here mentioned, every practicing dentist is aware of this fact, (which alone is

sufficient effectually to refute the assertion that teeth, from which the pulp has been removed, are entirely deprived of their vitality,) viz. that fangs, upon which artificial teeth are set, by what is known as the pivoting method, will remain in perfectly healthy condition for many years. I have known instances in which they have remained for thirty years, without giving rise to morbid action of any kind. It is well known, too, that the roots of the molar teeth, the crowns of which have been destroyed by caries, remain for years without producing the slightest irritation until they are, by a well known process, expelled from the jaws, and it will be always found, when they are extracted, no matter how slight may be their adhesion, that the peridental membrane, at some point, retains perfectly its vitality.

No other evidence is necessary to any one, however slightly he may be acquainted with the laws of physiology and pathology, to convince him that teeth are not entirely deprived of vitality when the pulp is taken away, than the fact just stated, that such teeth or roots do remain in the mouth without causing irritation. For it is well known that foreign substances, with few exceptions, cannot remain embedded in any of the living tissues without causing inflammation in such degree as to insure their speedy expulsion.

I do not propose to give more than this slight passing notice to such objections to the propriety of such treatment of teeth in this condition, because, as I have just stated, few, if any, intelligent practitioners of dental surgery, at this day, deny the practicability and usefulness, in some cases, of the process here alluded to, for the preservation of teeth after the pulp may have become exposed.

At the present time, the only question at issue relates to the best means of treating such cases. Two methods are proposed for this purpose, the objects of which are: 1st, Preserve the pulp uninjured. 2nd, To remove it entirely both from the pulp cavity and roots, and fill the place occupied by it with some substance not capable of being decomposed by the fluids of the mouth.

To effect the preservation of the pulp after it becomes exposed, the only means now relied upon by its advocates is, I believe, so to fill the cavity of decay as to avoid bringing the filling into contact with the pulp. This is accomplished either by placing over the pulp, at the place where it is exposed, a cap of gold plate, or so managing the filling as to leave a vacant space between it and the pulp.

The practice has been warmly advocated, and as strongly condemned. In my own hands, as I have already stated—although I am free to confess that I have practiced it in but few cases—it has not proved so satisfactory as to justify me in recommending it from my own experience. Professor Harris, of the "Baltimore College of Dental Surgery," who has had large experience in this operation, takes strong ground in its favor; and in a late number of the Journal, gives the results of a series of observations, running through a period of five years, which places this operation in a more favorable light than I have ever before seen it presented.

But I do not propose to go into a discussion of the relative merits of these two methods of treating the cases in question. It is not, indeed, necessary to my purpose: for, even if it be granted that the process just alluded to is the better one, a question which I am now disposed to leave each practitioner to decide for himself, its more sanguine advocates do not deny that there are cases of frequent occurrence, in which it is not advisable to attempt it, and that, in these cases, there is no alternative left between the sacrifice of the affected tooth and the extirpation of the pulp.

In some cases at least, then, in the present state of our knowledge, this operation becomes indispensable, and the best methods of performing it should be freely canvassed.

It may be well here to show why it is that when the destruction of the vitality of the pulp cannot be avoided, its entire removal is considered necessary, and what is expected to be accomplished by this and by filling the place occupied by it. This I shall endeavor to do.

The entire removal of the pulp, when this operation is attempted at all, is necessary for two important reasons. 1st.—To prevent inflammation of the peridental membrane, alveolar abscess, and its consequences. 2d.—To prevent the subsequent discoloration of the teeth so treated.

When the integrity of the body of the pulp is once even partially broken up, either as a consequence of diseased action, or in an attempt to destroy its vitality, it is my opinion that it rarely if ever again properly performs its functions. Its circulation no longer goes on normally, the blood which continues to be brought through the canal of the root, and through the healthy to the diseased part is no longer returned to the system, but escapes in the form of serum, lymph, healthy or unhealthy pus. As long as any portion of the pulp, retaining vitality, remains either in the pulp cavity or the canal of the roots, to invite blood into the interior of the tooth, this must occur. When it is removed and excised at the extreme end of the root, it may easily be conceived that these parts recover their healthy action, and in a little time, the blood formerly brought into the dental cavity is diverted by the anastomosing vessels into some other channel.

It is obvious, that as long as the matter formed in the pulp cavity or roots, finds means of ready exit, no pain or trouble of any kind will occur; but as soon as its egress is obstructed, it will accumulate till the vacant space is filled, and as the blood continues to be forced into the cavity, will give rise to a train of painful symptoms and consequences, with which every dentist is so well acquainted as to render a description of them unnecessary.

It does not follow, however, that in such cases, even if the obstruction is a permanent one, that teeth in this condition, will inevitably be lost. For, if the subject has the fortitude and patience to bear for a time the painful consequences which ensue, relief from pain will finally come in the form of an alveolar abscess, and the forming matter will once more find a way of escape. In time, the remaining portion of the pulp will be entirely deprived of its vitality, the cause of irritation, if so

much of the integrity of the periosteum about the apex of the root is not destroyed, so as to leave the bone bare, and consequently a cause of unceasing irritation, will pass away, the abscess may heal up, and the tooth become apparently healthy. But in such cases there is generally unhealthy action about the parts for many years, and a permanent discharge is kept up.

A great deal more could be said here, but as it properly belongs to another branch of my subject, the cause of and treatment of disorders of the peridental membrane, I will now pass it by.

2d. The entire removal of the pulp is necessary to prevent the discoloration of teeth treated in this way, because the decomposed tissues, and the discharged matter, will gradually pass into the bony substance of the crown, by which this part of the tooth will become, as is well known, much discolored, and eventually, in some cases, quite black. This is seen in a marked degree, in cases where, by a blow, the vessels passing to the pulp are destroyed. As a consequence of the death of the pulp, this discoloration of the teeth is so well known that we are many times asked by patients to whom this operation is proposed, in the case of teeth near the front of the mouth, whether they will not turn black. To accomplish this object, it will readily be seen, however, that the entire removal of the pulp from the minute portions of the canals of the root, is not so necessary as for the object just indicated, for if the pulp cavity and one-third of each root were filled, if no other untoward consequences were to be anticipated, the infiltration of the small remains of the pulp into the dental bone, would be effectually prevented.

The utility of the other part of the process: that of filling with gold, the place formerly occupied by the pulp, is not so clear. It is contended that after the pulp is entirely removed, fluid of some kind escapes from the point at which the vessels have been excised, and that it is important that such fluids should be excluded from the canal in the root and the pulp cavity, because they are liable, eventually, to bring about the destruction of the tooth treated, by being decomposed and

passing, by infiltration, through the parieties of the root, and thus reaching the peridental membrane. But even if this do not occur, such fluids, if it be granted that they do escape at this point, and find their way into the root, must effect the discoloration of the tooth by passing into the bony substance of the crown.

It is very easy, indeed, to conceive that a small quantity of fluid may be thrown off from these excised vessels, which may pass into the pulp cavity. If space is left for such fluids to accumulate and be retained until they become putrid and acrid, they must be productive of injurious consequenses to the surrounding parts, either by passing through the root, as above indicated, or filling completely the pulp cavity, and fang, they are thrown back upon the surface from which they have come, producing there all the consequences of the contact of such matters with living tissue. It is supposed that such fluids will again be absorbed, if they are immediately thrown back upon the surface from which they have come, which, it is maintained, will be accomplished by filling the root to the very apex, so as to leave an exceedingly small vacant place only, for the accumulation of such matter.

Such are some of the reasons given for the necessity of the perfect filling of the root in these cases, by those who have most extensively practiced this operation.

But it is by no means satisfactorily determined that any discharge does take place from the excised vessels and nerves, without the root, which are supposed to recover their healthy condition. And I am bound to say that observation has not satisfied me that it is the case. It is certainly safer and better, however, to fill carefully the larger roots of such teeth as are treated in the way indicated. But I cannot discover the utility of this practice in the case of those minute, hair-like canals in the external root of the upper molar teeth, which cannot, indeed be filled unless they are first enlarged ; and this is a process which requires so much time and labor, as so much to increase the cost of the operation as to place it out of the reach of most persons.

The utility, and in some cases the necessity, of the operation just indicated is now admitted by the better portion of the profession. But there is still amongst these a difference of opinion as to the best manner in which it should be performed. It is still a question whether it is better to remove the pulp with instruments alone, or first, by some means, to deprive it of vitality. For this purpose it is scarcely necessary to state that arsenic in some form, has for some years been extensively and almost exclusively used. It is well known, too, that this agent will certainly, uniformly, and completely, destroy the vitality of every portion of living tissue with which it is brought into contact, and if in the case of the dental pulp, it is employed with proper precaution, will effect this object without producing pain of consequence.

It has lately been proposed to apply the actual cautery by means of galvanic electricity. The instrument proposed for the purpose, has already been described in the "Journal." For the destruction of the vitality of the body of the pulp, this instrument could no doubt be readily and effectually applied, but when it is remembered, that a *loop* must be formed of the platinum wire used, it will at once be seen how impossible it would be to pass this into the canal of the root, in those cases in which it will scarcely admit an instrument a great deal larger than a single hair. This instrument, as beautiful and effectual as it seems on first presentation, is, I think I can show to be, of little value for our purpose. It is certainly so if it cannot be applied to the pulp in the contracted canals of the roots, for a better method of destroying the vitality of the body of the pulp, is by the application of arsenious acid; it is better, because it is certain in its effects, painless, and, I think I can show, harmless.

The dental pulp is endowed with a high degree of sensibility; when, from any cause it becomes inflamed, this natural sensibility is exalted to such a degree as to render the slightest touch of any foreign substance, a cause of the most excruciating pain. This has rendered it exceedingly desirable that some means should be used first to destroy its vitality, and thus

remove this extreme sensibility before attempting to cut it out. Arsenic, as we have stated above, has been found most effectual for this purpose, and at the present time, is used to the exclusion of every other substance known generally to the profession.

It has been strongly contended, however, that arsenic produces results more or less injurious in every case in which it is used, and it is regarded by some as always advisable to remove the pulp with instruments, regardless of the pain inflicted, rather than to use arsenic for the purpose of destroying the vitality of the pulp. This is the question which now divides the opinions of those who practice this operation.

It is not denied that the immediate effects of arsenic, applied for this purpose, are extremely satisfactory, but it is stated that the final good result of the operation is endangered by its use.

The manner in which this occurs, has never been clearly stated, to my knowledge—certainly not in any publication which has come within my reach. But, from what I can gather from various sources, it seems to be the impression that particles of arsenic are absorbed at once, and carried to the peridental membrane, producing irreparable injury to those important parts; or that after the lapse of some time, they, in some way, reach this membrane, and thus cause their injurious results.

Now, as I have stated, I have seen no account of the manner in which arsenic used for this purpose is supposed to be likely to produce injurious results. It has been stated by practitioners of high standing, it is true, that in their practice, it had not proved satisfactory, but had been more or less injurious. But what is their experience, when unsustained by argument, to me, when it conflicts with my own experience? and what is the value of their opinion in this regard, stated to be based simply upon their own experience, without further rational evidence, to the profession at large, when it comes into conflict with the experience of many others of equally high standing with themselves. It is not at this time sufficient to say, that in any one's opinion, a certain course is not a good course to be pursued. Let us therefore examine this question rationally on its own merits.

It has been vaguely stated, from time to time, as we have already intimated, that arsenic applied for the purpose of destroying the vitality of the pulp, would sooner or later, bring about the destruction of the tooth so treated—1st, by being absorbed and carried through the root, and so attack the peridental membrane. 2d. By passing laterally through the parieties of the roots; and 3d, of remaining after the pulp is removed, and in course of time finding its way to the investing membrane.

These are all the reasons I have ever heard of to account for the alleged injurious results of arsenic applied for this purpose.

Let us examine these statements consecutively, for it is important that we should come to a right understanding of this matter.

First—Can arsenic be absorbed, and by this means reach the investing membrane through the agency of the pulp?

Arsenic, we are told, by high authority, (See Liebig's Agricultural Chemistry, chap. xiv, on Poisons, Contagions, Miasms,) is not absorbed when brought into contact with living tissues. It combines with the surface of the organ to which it may be applied, destroys its vitality, and of course the power of absorption, which is a vital function. Where the quantity of arsenic applied is so small that every atom enters into combination with a corresponding number of atoms of the living tissue, if the organs have vigor enough, it is thrown off with the tissue which has been destroyed by its action. If there is an excess of arsenic, it may reach the vital portion of the tissue below the surface, by imbibition or capillary attraction.

If this authority is of any value—and even if it is not, the known action of arsenious acid upon the living tissues, is sufficient to bring any reasoning mind to a similar conclusion—it must be plain that arsenic cannot reach the investing membrane of the root by absorption.

It may, however, if it be applied in excess, and allowed to remain sufficiently long, gradually penetrate so far by passing through the destroyed portion in the way indicated, to the vital portion, and so on till it has passed through the root.

But, although it must be granted, that injurious effects may

occur in this way, it can easily be shown that arsenic, applied in the usual manner for destroying the vitality of the pulp, is not allowed to remain long enough to produce the effects indicated. It is generally allowed to remain twenty-four hours only. That this is not sufficiently long to enable it to make its way through the fang, by way of the canal, is abundantly proved by this fact: a small portion only of the pulp, on the removal of the arsenic applied, will be found deprived of vitality; it is probable that the vitality of the body of the pulp will be destroyed, whilst the portion in the fang will be found to retain all its vitality, and to display an increased degree of sensibility. Now, this must be regarded as incontestible evidence, that the arsenic applied has not passed through the root, because its invariable effect is to destroy entirely the vitality of any portion of living tissue with which it comes into contact. It may be said, that the fact that the part alluded to, retains its vitality, is no evidence that some of the arsenic has not reached it, but only that it has not had time to effect its destruction; but this objection is shown to have no weight, because these parts retain their sensibility for many days, and even weeks, as all who have practiced this operation must have found.

If the views and facts here presented, be correct, it is clear to me that no injury can reasonably be supposed to follow the use of arsenic in the ordinary way for this purpose, by absorption, and that when allowed to remain the usual time, no bad effects can follow. I should be glad to be shown it, if I am wrong in the position I have taken. I am sincerely in the search of truth, and am not anxious to establish any of my own opinions, unless they are founded upon this basis.

Second—Do the particles of the arsenic applied, pass laterally through the parieties of the fang?

Third—Do particles of arsenic remain after the pulp is removed, and ultimately reach the investing membrane, and thus, after a lapse of time, give rise to injurious consequences?

These queries may be answered together.

The only way in which this is possible, after the pulp is carefully and entirely removed, will be by passing through the

bony substance itself by capillary attraction. That this is possible when it is remembered that the dental bone is porous, and the arsenious acid is in a minute state of division, as it is when rubbed up with creasote, which, I believe, is capable of dissolving it, cannot be denied. But that it does not occur, is sufficiently evident from a little careful observation, and a little careful consideration of the phenomena, which would present themselves if this did occur. The arsenious acid is generally applied in the same manner, dissolved in creasote, generally in the same quantity, and allowed to remain the same length of time. Making due allowance for the difference in density of the teeth of different individuals, we must look for some degree of uniformity in the results of arsenic used in this way. It would take a certain length of time for the arsenic to pass through the root, and we cannot suppose the difference of density usually found to exist in the teeth of different persons, would make any very great difference in this respect. The time required to allow the arsenic to pass by this means through the bone, reasoning from the analogous case of the same substance applied to the bone of a living tooth near the pulp, could not be very long. A month, we should think, would be ample time. Yet, after years have elapsed, we observe no consequence of the kind. And it must be remembered that if arsenic found its way through the root in this way, that its peculiar effect upon the investing membrane would with certainty display itself, and would with certainty result in the destruction of such parts of the investing membrane which it touched. I find it impossible, then, in this view of the case, not to conclude that none of the arsenic after it is applied in the usual way, is left behind after the pulp has been removed and the pulp cavity and canal in the root washed out, or if any should remain, it is so inconsiderable as to do no harm.

I think I have shown that we have no reasonable ground to suppose from the nature of arsenic and the manner in which it affects living tissues, that it can exert any injurious influence when applied for the purpose here indicated.

I am anxious that this point should be established, for, unless

we can use arsenic or some agent effectual for the purpose accomplished by it, our usefulness in this way will be extremely limited. The removal of the pulp, unless it is first deprived of vitality, is, in all cases, a painful operation, in most cases excruciatingly so. It is a painful operation to remove the pulp from the incisor and canine teeth, but it can be done with great rapidity, and although the pang of pain produced is, in most cases, exceedingly severe, it is so soon past, that many persons can be induced to bear it. But when the pulp is to be removed from the contracted fangs of the molar teeth, in which it is often exceedingly difficult to find even the openings of the fangs, the operation is so excruciatingly painful, that I am sure not one patient in fifty, who have passed through my hands, would be willing to submit to it. I have already endeavored to show why it is important that the pulp should be effectually removed.

I am aware that gentlemen have declared that the pain attendant upon the operation is inconsiderable, but this is inconceivable, I must confess, to me, unless it is performed by some method with which I am unacquainted.

I have thus far been endeavoring to show that arsenious acid used in the manner in which it is usually and generally employed in the profession at the present day, cannot reasonably be expected to do the injury which has been attributed to its agency. It must be remembered that many, if not most of those gentlemen who have opposed its use, have been extremely cautious how they have applied it, using a very small quantity (the twentieth part of a grain) and allowing it to remain a very short time, (from twelve to twenty-four hours.) This last point is strongly insisted upon, as also the importance of avoiding a second application to the same tooth.

Now, I am prepared to go still further, and to declare my belief from careful observation of the effects produced by it in my hands, that it may not only be applied more than once, but be allowed to remain much longer than this, not only without injury, but with great advantage. It is true, that I do not use it

in the form of arsenious acid, and this may make an important difference. Of this I will say more in the proper place.

Before proceeding farther, I beg leave to offer in proof of these assertions, and the above reasoning, a record of some of the cases which have passed through my hands in the course of the past six years. I have not kept a record of all my cases. Those which I now present have not been selected. In almost every case here cited, the arsenious acid has been applied more than once, in some cases as often as five or six times.

Since January, 1846, the time at which I began to record these cases, I find marked down the treatment of seventy-seven teeth in this way.

Of these, 19 were incisor, or canine teeth.

31 were bicuspides.

20 were first and second molar teeth.

7 were dentes sapientiæ.

Of the incisor and canine teeth, 18 were of the upper, and 1 of the lower jaw.

Of the 31 bicuspid teeth, 22 were of the upper, and 9 of the lower jaw.

Of the 20 first and second molar teeth, 14 were of the upper, and 6 of the lower jaw.

Of the dentes sapientiæ, all were lower teeth.

Of these cases, I have, from time to time, covering several years, seen twenty-six. I have not been obliged to extract one of these. In one only, which has come under my observation, has alveolar abscess occurred, and this by no means an aggravated case. It formed in about two years after the operation was performed. The tooth treated was an inferior dens sapientiæ, and an unfavorable case, because, from a variety of causes, it was impossible to perform the operation thoroughly. Another tooth filled for the same lady at the same time, a second inferior molar, was in a perfectly healthy condition, presenting no trace of inflammation at the time I had an opportunity of examining the other one.

Of these cases, I have seen six which had been treated in this manner, some considerably over two years, and all over

eighteen months, these were in a perfectly healthy condition, no trace of peridental inflammation being apparent.

In some of these twenty-six cases, seen several months after the operation, there had been occasional slight attacks of inflammation of the peridental membrane, evinced by more or less tenderness to pressure, but which always passed away without giving rise to serious consequenees.

I have not felt obliged, as I have stated, to extract a single tooth I have treated in this way, during the five years I have been in practice in Washington. I have treated more cases than I have recorded, and the patients are where I should be sure to hear from them, if trouble occurred. That not many of them have passed into the hands of other practitioners, I may safely conclude, because most of them still send their friends to me, when they desire the services of a dentist.

It will be observed from this statement, that I have seen, from time to time, one-third of the cases of this kind which have come under my treatment. Out of these, but one case can be said to have failed, and this was evidently traceable to an imperfect operation. But even this cannot be regarded as a failure, for many such cases of abscess occur, which are completely cured by the removal of the irritating cause, probably in this instance some portions of pulp remaining in the smaller parts of the canals of the roots, and they frequently heal spontaneously.

What I principally desire to establish, by the recorded cases offered here, is that the bad effects attributed to the action of arsenic applied for the purpose of destroying vitality of the pulp, do not in reality follow its use. For if any portion of the arsenic applied were to reach the external membrane, which it could only do by passing laterally through the parieties of the root, for all ingress through the root must be prevented by the filling, it would certainly and surely, and speedily produce effects which would make the extraction of the tooth necessary. The same would be the result if any portion, however small, were allowed to remain in the canal above the filling, its effects would, indeed, be more quickly displayed.

I know that such records of general results as I have presented here, are not very highly valued in the profession: for men, the most honest in their intentions, are so apt to see things in a favorable light when they wish to do so. After theories are formed, we are so apt almost unconsciously to make facts bend so as to establish their truth, and facts stated as having been seen in this light, are justly regarded with many grains of allowance. But the cases I have presented, if they are true, and I affirm that no bias or prejudice could lead me to make, knowingly, a single misstatement or exaggeration, even if they do not convince the sceptical of the permanent utility of the operation (for it may, with truth, be said that time enough has not yet elapsed to test its full value,) it will at least make good the point for which I am now contending, and will show that the operation advised is productive of results sufficiently desirable to warrant its practice. In the course of the treatment of the cases of which I have here presented, a mere meagre outline of general results, I have learned many instructive lessons. I have in many of these cases recorded a great deal that was interesting and useful to me at the time, and which has led me to conclusions which I hope I may be able to state in such a manner that they will be useful to others. I know well, now, that if I could have had the same directions to guide me in the course of my own practice, in this way, I should have been saved much trouble and my patients much pain.

ARTICLE II.

Address Delivered before the Graduating Class of the Baltimore College of Dental Surgery, March 1st, 1852. BY ELEAZAR PARMLY.

GENTLEMEN GRADUATES:

I feel happy in congratulating you on the completion of your collegiate course, and in expressing to you the high satisfaction which I feel, in common with other members of the examining committee, at the very creditable manner in which you have earned your degree.

Neither the duty nor the pleasure of addressing you on this occasion, was originally assigned to me, nor does it belong to my particular office, but permission having been granted to me, I ask your particular indulgence, while I make a few remarks on the subject of dental education, as connected with dental and medical colleges. I am led to do this in vindication of my own course, and that of the institution from which you now graduate; and also as an act of justice to your professors—to the former graduates, and to the gentlemen of the examining committee. These latter gentlemen have been appointed, from year to year, to bear testimony to the professional practice and principles taught in this institution—to the various courses of instruction and to the finished specimens of artificial manufacture, as well as of the higher operations in dental surgery, of those who are deemed worthy to receive the diploma of the college.

The necessity which has made this duty at this time imperative, may be found in some remarks in an article in the New York Journal of Medicine, one of the most valuable and widely circulated periodicals devoted to medicine, and the collateral sciences published in this country.

The title of the article to which I allude, is "Dental Education," its author, John Trenor, M. D., dentist, of New York.

Dr. T., after very largely and very properly setting forth the necessary qualifications of dentists, to insure to them complete success in professional practice, and also in the evils which have existed, and still exist, in regard to the imperfect manner in which, by far the largest portion of dental practitioners have been educated, uses, in relation to the dental colleges, the following words:

"Under the plea of remedying all these evils, what are termed dental colleges have been recently brought into existence. Conscious of the wants in this branch of the medical profession, and of the obvious inefficiency of a large number of those who appear in the capacity of its practitioners, and a belief taken, if not altogether for granted, certainly without sufficient investigation, that these institutions must necessarily remedy the deficiencies so generally felt and justly complained of, some of the members of the medical profession have accorded to them a degree of countenance and approbation, to which it can be easily shown, that they are by no means entitled. They come before the public with such confident promises and plausible pretensions, and as at present constituted, are so decidedly inefficient, that they are a greater drawback to improvement than if they had never existed. They profess to remedy an evil, which they most effectually and glaringly magnify. They hold out the idea of giving a complete and finished course of instruction on dentistry, while full two-thirds of what should be taught, and that the most important too, viz. all the instruction which every medical school inculcates in medicine and surgery, it does not enter into their arrangements, nor do they possess the ability, with any degree of usefulness or benefit, to perform."

Now such language applied to this college is either true or false. If true, it should be sustained by stronger evidence than bare assertion; if false, let it be thrown back upon him from whom it emanated. It is a fact, that he who published this to the world, has never entered these walls, nor does he know any thing, by personal examination, of the system of instruction here pursued, and it is equally true, that

if he had been acquainted with its various courses of instruction, as a man of common courtesy, of honor and honesty, he could not have uttered such sentiments. Dr. T. has unnecessarily treated with personal insult and indignity all who have been connected with, or interested in, this institution. As the Baltimore College of Dental Surgery is the only one of the kind that has until lately had a name or an existence in the world, and the only one that has been acknowledged, sustained and approved by medical men, we are particularly called upon to understand that this is the college at which this shaft has been directed, and its professors and teachers are the men who are charged with being instrumental in establishing the "greater drawback," and in retarding the progress of professional improvement. But more than all this, those distinguished medical gentlemen who have been chosen as a committee, from year to year, from among the most eminent practitioners of this city, and who have patiently attended upon the examinations, are "*the members of the medical profession,*" to use the language of Dr. Trenor, "*who have accorded to them a degree, countenance and approbation to which it can easily be shown that they are* (the colleges) *by no means entitled.*"

Had Dr. T. visited this school, and here witnessed the weakness, imbecility, and error, which he would fain ascribe to it; and had he, from careful observation, attained to an honest belief of what he asserted, he would have had some excuse for his sweeping denunciation, though, even then, no warrant for the harsh expressions he has used. But as it is, evidently without the slightest knowledge of the studies pursued in this college, its discipline, its order, or its exercises, he has charged inefficiency upon the whole system, and questioned the judgment and candor of some of the most distinguished physicians of Baltimore, and dentists of America, who, by testifying to the qualifications of the graduates, have given their "*countenance and approbation*" to this school.

When I speak of the eminence of those medical gentlemen, I wish to be particularly understood as intending to declare that they stand upon the highest plane of their profession, side

by side, with the most eminent men of other cities, and of other lands. And these are the men who have aided "*most effectually*" the efforts of this college to "*glaringly magnify*" the evils of ignorance, quackery and presumption, if I may be allowed to repeat, in this assembly, the disrespectful language that has been applied to the professional gentlemen of Baltimore. This, besides being uncourteous, is untrue, for it cannot be proven that any other than the best principles and practice, and only the best known to dental surgery, have been taught here.

Dr. T. may not be aware of it, but we assert it, and challenge successful contradiction, that all the evils that have resulted or ever will result from the practice of all the graduates of this, and other dental colleges, that teach the same principles, will never equal the *glaring* one which he daily *magnifies* in recommending and using mercury and silver as a better stopping for teeth than gold, and professors who teach this amalgam doctrine, and amalgam practice in medical colleges will do infinitely more harm than good to the students, to the profession and to the public. Certainly the medical colleges who appoint such as lecturers or professors to teach dental surgery in their institutions, will "*accord to them a degree of countenance and approbation to which it can be easily shown that they are by no means entitled.*"

As I may not have another opportunity, I will avail myself of this, to express on my own behalf and on behalf of the college, our grateful thanks for the "*countenance and approbation*" so often and so generously bestowed upon this institution by the gentlemen in question; and the strongest proof that I can give of my confidence in the system of its instruction, may be found in the fact, that notwithstanding we have medical schools in New York, which compare with the best institutions in the country, and notwithstanding I can furnish under my own roof as many facilities in the practice of dental surgery and mechanical labor, as can be found in any other private dental establishment, I have sent my only son and other members of my family to the Baltimore College of Dental Surgery, for the purpose of

securing to them better and more complete instruction than any one individual can impart.

To this, I may add, that I have heard dentists and medical men, on our committees of examination, professors in medical colleges of highest rank, who stand as erect, morally and professionally, and who are, in every way, as capable of judging in the matter as those who have never been here, and know but little or nothing of our policy, declare, after "*sufficient investigation*," that the system of instruction hitherto pursued in this college, is the most perfect that has ever been offered to the dental student; and we have good reason to believe that other colleges, founded on the same basis, will fully sustain "*the confident promises and plausible pretensions*" set forth in their annual announcements.

It is, however, a gratifying evidence of the scientific progress of the present day, that dental instruction, embracing a general knowledge of the structure and diseases of the teeth, is engaging the attention of some of the most popular medical schools of our country.

As we have anxiously desired, for more than a quarter of a century, "a consummation so devoutly to be wished," I shall confine the few remarks I have now to make, particularly to its relations as far as they affect the interest of the profession, and it becomes peculiarly appropriate as I regard it as decidedly the most auspicious "sign of the times" in favor of that class of institutions of which the Baltimore College of Dental Surgery is the *pioneer*.

It is worthy of remark, that the fortunate event of which we now speak, has been the direct or indirect result of the efforts of one, who may differ widely in opinion from us, in relation to the necessity of dental colleges, or institutions of practical learning. Whether his only aim at first was to do entirely away with this class of schools, by substituting what he conceived to be a better system of dental education, at the same time raising the character of the profession to a level with other departments of medical and surgical science, I know not: but believing this to be the case, I respect both the motive and the mover of this propitious change.

The proposition when published, having been well received, it was soon followed up by another member of the profession, with a zeal and earnestness which, with sufficient power, would not only have swept from existence our edifices themselves, but would have visited with obloquy and reproach, all who have, in any way, extended to them their "countenance and approbation." This latter effort may possibly have a very different effect from what it was anticipated, and should it even prove to be so, it will not be the first example in the history of science, of the unintentional advancement of the interests of truth, by its secret or avowed enemies.

It is not necessary to waste either time or words in enumerating reasons which may be supposed to have operated with our friends or our enemies, to induce them to appear in argumentative opposition to a class of modern institutions, chartered by the legislatures of several states, for the special education of a numerous profession, essential to the welfare of civilized society. If their motives have been benevolent, as we have no disposition to call in question, they will not fail of the reward—an approving self-respect.

But whatever may have been their promptings, the result has been auspicious to the permanent well-being of the dental profession throughout our land ; and will establish the necessity for the continuance of the schools that now exist, or will call into existence, in some other way, a system of instruction, embracing all that is now taught in them, for I affirm, and fear not contradiction, that practical dentistry cannot be acquired so perfectly in any other way, as in a system similar to that practiced in this school and adopted by others.

There are in the United States, twenty-seven medical colleges, not quite one for each state. Twenty-seven dental lecturers, or one in each of these schools, would produce the most salutary effect in elevating the character of the dental, and impressing the medical, profession with the importance of the subject.

The arguments that have been employed by some of our professional co-laborers in medical and dental journals of a recent

date, have already led to the institution of at least one dental lectureship in one of the medical schools of New York. During the past autumn, Dr. C. C. Allen was employed to lecture to a class of medical students in the New York Medical College, and more recently it has been understood that there will be established a dental professorship in the College of Physicians and Surgeons of the State of New York.

These instances alone, as good beginnings, we hail with pleasure, and the sooner such precedents are followed by other medical institutions, the better it will be for the profession, for the public at large, and for those special colleges established for the education of practical dentists. We say *practical* dentists, because we regard it as one of the wildest chimeras of the age, to suppose for a moment that a practical education in the difficult art of dentistry can ever be attained in the class lecture rooms of the best medical college in the world.

It has been asserted in a quarter, from which truth on this subject ought to emanate, that the dental practitioner cannot be fully qualified for the duties of his calling, without a thorough knowledge of medicine and surgery, such as dental colleges are not qualified to impart. The fallacy of this position is plainly manifest without an argument, and scarcely needs the antidote of a sober denial. It possesses not a whit more truth than the parallel proposition, that the medical and surgical practitioner cannot exercise his calling successfully, without a more perfect knowledge of the dental science than the medical colleges are prepared to impart. If the former position destroys the necessity of dental colleges, the latter equally denies the utility of all schools of medicine and surgery.

Yet will the universal appointment of dental lecturers in medical schools be welcomed with honorable pride by every high minded member of our profession ; for what can more directly elevate the theory of dental science to its merited position, among the kindred sciences, than to find its collegiate professorships working side by side with those of general anatomy, medicine and surgery ?

Well may we say, that in our favorite calling, the present is an age of progress; for in truth, the most ambitious members of the dental profession neither ask nor desire any higher exaltation, than to stand upon an equality with the oculists, the aurists, the surgeons, and the physicians, who receive their elementary and preparatory instruction in the medical schools of the age; and this will be their position when all the schools of general surgery and medicine shall find it expedient to annex to their professorships the chair of dentistry.

Nor can such a policy fail to become necessary to the prosperity of even the secondary grade of medical colleges, as soon as those of the first class in the larger cities shall have fairly set the example. Let it then be hailed as a matter of the most sincere congratulation among the members of our profession, as well as among the dental colleges now established in several of the United States, that the medical colleges of New York and Philadelphia are rapidly moving in the direction of this most desirable object. If New York seems to have taken the lead in this movement, it is probably more in appearance than reality, inasmuch as Philadelphia was first to agitate the question.

This she did, not only by the friends and conductors of the medical colleges, but most effectually by one of the justly celebrated dentists of that city, Dr. E. B. Gardette. This gentleman, of whose professional skill, educational accomplishments, and personal excellences of character, there is little danger of speaking in terms of unmerited praise, has taken unwearied pains to convince the faculties of the several American colleges of medicine and surgery, of the great utility of dental professorships in those institutions of learning.

So far as Dr. Gardette's well-considered arguments demonstrate the importance of such professorships, we admit, most frankly, the full force of his reasoning; but we have been unable to discover any proof that such professorships preclude, in any manner, the separate necessity of colleges, or of some other adequate means of practical instruction. For "*it can be easily shown*," that medical colleges at best, can only best qualify students for entering upon a practical course in "*what are termed Dental Colleges.*"

The reasons of this difference in the results of his argumentation, will manifestly, we trust, appear in the sequel.

It must be clearly evident to all sensible men, that the advantages to be derived from the lectures of a professor of dental science in an ordinary medical college, are entirely distinct and different from those of a class of professors and teachers in a dental college, where practice is blended with theory in every step of the student's progress. Particularly will this be manifest to persons familiarly acquainted with the methods of instruction in these two classes of institutions, of which number should be all those who undertake to disparage dental colleges, when compared with those of general surgery and medicine.

Nothing can be more certain than that medical schools will introduce nothing in the way of instruction which does not meet the wants of all classes of their students, as well those who are to be physicians and surgeons, as those who are to be dental operators in after life. Hence it follows, that the trustees of those medical colleges which may have instituted lectureships in dental science, are fully convinced that all these classes of students need a certain amount of reliable information in relation to the structure and diseases of the teeth. They all need this knowledge, because it pertains legitimately to all departments of the healing art; and if such general knowledge of dentistry were not common to the necessities of all these classes of students, it would be evidently absurd to waste upon it the time and treasure of medical students.

In dentistry it is the province of the brain to direct, the hand to execute, both must work together, and as much care is required in educating the one as the other; and he who has any adequate knowledge of dental practice, or of dentistry as an *artistic science*, in which the *science* alone is of no practical utility without the *art*, needs not to be informed that a dental student coming to the duties of his profession with no other preparation than such as he could gain in common with other pupils of medical schools, would be about as fit for his business as would be the commander of a ship who studied navigation in a country academy, and who had never seen even a ship or

the ocean, or a merchant who had attended a few lectures on penmanship, commerce, arithmetic and free trade.

There can be little doubt that a promiscuous assemblage of young gentlemen, destined for the various avocations of human society, and engaged in their educational studies, might derive some benefit from a well composed lecture from a master of his subject on either navigation, penmanship, arithmetic, or commerce; but the question still recurs, is this *the best*, or even a practicable, mode of teaching thoroughly these branches of learning? Has it ever been known in any age or nation, that a man has been taught to write a handsome business hand with his right hand in his pocket, listening to the mere verbal instructions of his teacher? And yet we hazard little or nothing in the assertion that the difficulty of writing a good business hand is not for a moment to be compared with that of becoming an expert, well instructed and elegant operator in dental surgery, or even in what has been inappropriately called dental mechanics. It is not, we think, too much to say, that of every thousand individuals it would be more probable that fifty would become good penmen under competent masters, than that *one* only should become an accomplished dental operator under the best possible instruction. To those most familiar with the subject, who have witnessed for years the wretched operations of amalgam dentists, first "medically educated," this will be seen not to be taking too high a ground for the profession which we exercise.

That amalgamists should recommend medical colleges as the best sources of gaining professional knowledge, causes no surprise, for there they can, in a single lecture, and a short one too, from the professor of chemistry, learn not only the compounding, but the nature, quality, and effects of amalgam, besides its "*artistical employment*"—but skilful dentists who have obtained their knowledge and skill by hard labor, know that it is just as impossible to become a good operator on teeth, from hearing lectures, without using the hands in dental manipulations, as it would be for a man to become a distinguished artist by reading the lectures of Sir Joshua Reynolds, or the life and early history of Sir Benjamin West.

But, perhaps, it may be said that a system of as thorough instruction in practice as well as theory, may be instituted in the ordinary colleges of medicine and surgery, as those now devoted exclusively to dental education—but this is yielding the argument, and fully admitting all that we wish to prove. For then it instantly transforms a medical college into a college of dentistry, and we are not disposed to deny that after such a change one would be just as efficient as the other. But this is by no means the point at issue between us and the opposers of dental seminaries. They would fain persuade us to believe, that a simple lectureship in addition to those existing in medical schools, and such as has been recently established in New York, is better adapted to the purposes of dental education than such dental colleges as are now in operation in several of the American states. This is the point in question, and to this we hold our antagonist, or one of them at least, as being the very position which he has voluntarily assumed.

I value, appreciate and would most earnestly recommend to the dental practitioner the very highest degrees of scientific and professional attainment—but not to the exclusion of common civility and common respect towards those who do not come up to an assumed or a real standard of professional qualification.

There are five teachers in this school who embrace in their teaching, anatomy, physiology, pathology, therapeutics, including materia medica—the general principles of surgery, surgical operations of the head and neck, and the theory and practice of dental surgery proper.

If these several branches are not in this school and should not be in others as perfectly taught as they might be, the fault lies not in the system, but in the teachers, or may be with the students, and yet with the most perfect teaching and best students it is declared to be a one-third system. We will, therefore, for a moment, examine the justice of this remark, and bring in as evidence the labors of those who have given the highest dignity and the highest character to our profession.

We are familiarly acquainted with the finished qualifications for usefulness of a great number, all of whom commenced prac-

tice and rose to eminence with much less than one-third of the advantages furnished by this one-third system; and among such may be found the names of Hudson, Nasmyth, Waite, Cartwright, Koecker and Hayden.

I am constrained to make these remarks from the indignities so often shown to those whose good fortune it was not in early life to receive from charity, or otherwise a medical degree, from a medical college. And I would further say, that the complimentary or honorary degree conferred near the close of his life, of which so much has been said, upon the celebrated Hudson, relative, patron and preceptor of him who now stigmatizes dental colleges, was not conferred for his early studies in medicine and surgery, but for the eminent services and aid he rendered in elevating, by his labors, a branch of the healing art— and the bestowal, or the receiving of his diploma, added nothing to his professional merit, or to his professional qualifications.

Of all the distinguished men who have preceded us in our professional art, whose operations secured to them the greatest name, and to their patients the greatest good; there was no one among them, as far as I am acquainted with the history of dentists, who was at the outset of his professional career "medically educated," but they were all those, I believe, who obtained their knowledge by personal study, observation, and practical experience. And we affirm, from knowledge and experience, that ten years so spent was not equal, in practical advantage, to two years in a school of dental surgery. The difference between the two systems is best seen and determined by comparing the rough and unfinished operations of the first class, whether medically educated or not, with the beautiful and finished productions that we have here witnessed from the hands of the graduates of a dental college.

We shall, therefore, conclude our remarks by condensing our opinions on this subject with the following simple propositions, to which we invite the attention and the criticism of all respectable gentlemen who differ with us in opinion on these matters.

First.—Students of general surgery and medicine do not need, and therefore will not seek any other than the most general principles of dental science, and, consequently, they would not assist in sustaining a complete course of practical and theoretical dental instruction in any one of those colleges.

Second.—If only one lecturer be sustained in each medical school, and if he confine himself to subjects equally important to all classes of his pupils, still the student in dentistry will be left to seek his practical education where best he can find it, and after all, to make his selection between private instruction and public dental colleges.

Third.—The advantages accruing to the dental practitioner from a general acquaintance with the principles of medicine and surgery are not only admitted, but positively declared and insisted upon by all the dental colleges, and their advocates, inasmuch as competent professorships in all kindred branches of the healing art, are actually established and sustained with zeal and talent in all these seminaries—by men, too, who have held corresponding professorships in medical colleges.

Fourth.—The past history of dental practice has demonstrated the fact, that the greater part of the truly successful members of the profession, almost without an exception, have derived the elements of their success from sources widely different from the sciences taught in the schools of medicine and surgery, however useful, we contend, those sciences must be admitted to be, in connection with their other qualifications.

Fifth.—There is not the remotest probability that a course of really practical instruction in dentistry, either surgical or mechanical, will ever be incorporated with the ordinary lectureships of medical colleges, and, in consequence, in spite of all argumentation on the subject, the student in dentistry will, at the close of his collegiate medical courses, when only he will be best qualified to enter a dental college, be left where he now is, to make his own selection between dental colleges and private instruction, or what is still more probable and desirable, that he will avail himself of the peculiar advantages of both, as do the students of law and medicine when they commence

and complete their education in the offices of their private teachers.

Sixth.—The necessity of private tuition is at least partially obviated by the privileges which the students of this college enjoy in the infirmary connected with it. In the provisions of this valuable institution, the pupils of the Baltimore College of Dental Surgery are permitted to bear their part, and as in all other charitable or benevolent objects, to derive benefit and advantage to themselves whilst they do good to others.

During the session of this school, which closed in 1851, the number of distinct dental operations performed in the department of that institution appropriated to the students, amounted to upwards of seventeen hundred, and during the session which now terminates, to about an equal number.

This is a fact of very great importance in estimating the advantages enjoyed by students educated at this school, or at others having the same facilities.

If facts, like these which I have given, do not thoroughly substantiate the claims of dental colleges to the reputation of "*usefulness*" and "*benefit*" in professional education, then I have only to add, that *error* is as beautiful as *truth*, and slander more just than justly "*accorded countenance and approbation.*"

There is a great deficiency somewhere. If the faculty of this college, consisting of five professors, possess combined talent and knowledge equal only to one-third of what is assumed by Dr. Trenor, and if their combined efforts enable them to teach one-third only of what he individually professes to know and to be able to teach, and *that* one-third is only one-third of what it is "*most important*" for students to acquire, there is certainly a great want of talent, truth and ability, on the part of the professors. But if they do faithfully perform and fulfil all their "confident promises and plausible pretensions," and teach at least, *one-half* of what the Doctor is able to teach, and one-half of what it is "most important" for the student, in his preliminary course to learn, then, there is a great want of respect, truth and justice in Dr. T's remarks, and to you who have had ample opportunity of judging, I submit whether

your professors, by an honest discharge of their obligations and responsibilities, and a faithful fulfilment of their "promises and pretensions," have rewarded you for the time you have spent, and for the pecuniary and personal sacrifices you have made in coming to Baltimore. Or whether they, by a total neglect of their duties, and by falsely assuming to teach what they do not "*possess the ability with any degree of usefulness or benefit to perform*," have deceived your hopes, disappointed your expectations, and despoiled you of your time and money. With you, my young friends, with every good wish for your health, prosperity and happiness, I leave the decision of the question.

ARTICLE III.

On Excessive Hemorrhage from the Extraction of Teeth, with Cases. By J. L. Levison, Brighton, England.

Those who are acquainted with the diseases connected with the sanguiferous system, are aware that extreme hemorrhages may result from many causes: from accidents; from debility in the coats of the arteries, as in purpura hemorrhagica; from a state of plethora; from surgical operations; from unequal circulation; as a symptom of scorbutus; and lastly, from the extraction of teeth. The latter, which will form the subject of this communication, is not exactly similar, either in the conditions of health under which it may occur, differing in different cases; nor can it be always distinguished from the preceding kinds; we therefore propose to detail some instances, with the remarks they suggest, and the treatment found to be the best to be depended upon; and afterwards add the substance of the information interspersed in medical works. For though the occurrence is rare of excessive bleeding after the extraction of teeth, still, when it does occur in the practice of the surgeon dentist, it is important that he should know what is best to be done under such exigencies. And it is just because there are

but few of the emergent cases recorded, that those now to be submitted may be worthy of attention, and may induce others to communicate similar instances, so that ultimately some practical inferences may be given explanatory of the physiological and chemical condition of the blood in persons of this diathesis. That this notion is neither unreasonable nor uncalled for, will be admitted, when we state that nosologists have not given a name to this idiopathic form of disease, to distinguish it from other forms of excessive bleeding:* much less have they attempted to define the symptoms by which it is indicated.

From the consideration that every one practicing in surgery or medicine, is more or less indebted to preceding observers, it becomes, therefore, a principle which cannot be too often enforced, that all facts, whether connected with any special form of disease, or as evidence of distinct modifications, that it is a duty to bring them to the common stock, whether they may appear of sufficient interest or not, either in confirming previous conditions of disease, or in elucidating phenomena which had heretofore been obscure. And farther, in justification of the feeling which prompted this communication, the writer could not find in any of the medical dictionaries, (Hooper's, Parr's, &c.) any allusion to this special form of disease or particular idiosyncrasy, except a short notice in Cooper's Surgical Dictionary,† which is given under the generic phrases "Of BLEEDING DIATHESIS," or hemorrhagic tendency. Before then citing our own cases, it may be further premised that all that is known, on the conditions of health and disease, has been obtained by many observations on individuals, comparing their normal states of bodily and mental functions; and their disordered conditions or symptoms, and in this way *data* have been accumulated so as now to enable practitioners to distinguish in their diagnoses, any resemblances, or special differences. But this has not been done in the disease which is treated of in this paper, and which it is hoped will be of some interest to the readers of the Journal of Dental Science.

* For example, hemoptysis, epistaxis, hemeatemesis, hematura, &c.

† See Supplement, note *a*.

The dangerous bleeding which often takes place after the extraction of a tooth, is, *sui-generis*, so far as its present history is to be depended on. Even in the cases to be detailed, there did not seem any well marked analogy in the conditions of health of the different patients, or in their physiognomical expression—but which are so well indicated in other forms of excessive bleeding. One thing seems certain, as confirmed by experience—that it is not only idiopathic, *but* hereditary.

Case 1.—During my residence at Birmingham, Joseph Hodgson, Esq., an eminent consulting surgeon, recommended a lady to me, to remove some diseased molar teeth. She appeared ill from continued suffering, and the injurious effects of broken rest. There was great palor and feebleness in her features, she seemed of a cachectic habit, and that want of stamina, so well expressed in popular language, "as not looking in good health." She was of a nervo-lymphatic temperament. When the teeth were removed, she bled freely, yet not so much as to alarm either the patient or myself. A simple styptic sufficed to stop the hemorrhage, by means of a piece of cotton dipped into the oil of turpentine, and pressed on the bleeding vessels.

The operation took place at 10 o'clock, A. M., and at four in the afternoon, I had a message brought by her man servant, "that the lady from whom I had extracted the teeth, had been bleeding ever since, and that she was in a very weak and dangerous state!" The messenger himself looked as pale as if he had been deputed to announce to me the death of his mistress.

Prepared with every means that might be required, I went off to do my best, armed with many potent compounds, tinct. *ferri*, *muriat*, *argentum nitratum*, &c. On my arrival at the hotel, I saw consternation in the faces of all! An attendant showed me to the patient's bed room, in a hurried and nervous manner. She was lying on her bed in a prostrated condition—her face blanched and terror-stricken, but restless and irritable; with a pulse very low and feeble. I stopped the hemorrhage by forcing a stick of caustic (the argentum nitratum) to the bottom of each septum of the alveolii, and by crushing some

of it and dissolving it in a little water, so as to be able to saturate some pieces of cotton wool, and so pressed it down, that each cavity was firmly plugged. Soon the bleeding ceased, and the patient fell into a sound sleep, and at the end of two hours awoke much refreshed, the bleeding having entirely ceased. From her, however, I learnt that on a previous occasion when she was obliged to lose a portion of a tooth, she had bled without any intermission for 35 hours, until she fainted, and the hemorrhage stopped of itself. She also told me that many of her family had the same peculiarity, particularly on her mother's side.

After these details, we may venture to affirm that no one would class the case of this lady as one of purpura hemorrhagica, as she was free from all extravasation of blood under the cuticle. There were neither spots nor patches, nor any hemorrhagic discharge from any other organs usually affected in this form of disease. Further—the bleeding of this patient cannot be considered as a symptom of scorbutus. For in this latter, depressing disorder, the gums often form a diagnostic sign of its presence, in which case they scent the air with a nauseating fetor. The case itself made me a little fidgetty, as there had been a fatal one just before, in the modern Athens, and which, with all the skill of the Edinburgh men to save the poor fellow, proved useless. (Read Lancet for the year 1841 or '2, in which the details are recorded.) My nervousness was in consequence of a paragraph that went the round of the papers, entitled "DEATH FROM THE EXTRACTION OF A TOOTH," and induced extreme dread in those who required the operation. Whilst the recollection of these things was still vivid in my memory, a surgeon, the late Alfred Jakes, Esq., of Birmingham, sent a young girl about eight years old, to have the first permanent molar tooth extracted. She was very pale and thin, and of a strumous habit—at the same time suffering from whooping cough. Mentally she was deficient, having small anterior lobes. Whilst in the few brief minutes I saw her, she displayed strong opposition, the symptoms of a more than ordinary combativeness and destructiveness, which produced a fit of coughing of

such violence that she split the skin of the lower lip, when, literally a stream of thin limpid blood poured forth, and therefore, as I had not any ambition to kill the little termagant, I persuaded the mother to use a wash for the mouth, giving her a prescription, being very glad to get rid of such a patient.

In this instance, there were many symptoms which resembled scurvy—the fetor of the breath—the tumid state of the gums—the expression of the face—the general emaciation and debility, and hence the bleeding in this case from the weak state of the arteries, might be referred either to the scorbutus or to purpura hemorrhagica, as it might be regarded as spontaneous.

We shall find that the quantity and duration of the bleeding from the extraction of a tooth, are not to be indicated by the apparent health of the patient, as the following will testify.

Case 2.—Mrs. L—— made a voyage from Jamaica to England, under an impression that the journey and the treatment by eminent medical men in her own native country, would restore her to health. Finding herself not so much improved, and requiring a tonic atmosphere, she was recommended to this "Queen of Watering Places," where I had been located since 1844. Some time in 1846 she consulted me for her little daughter, from whose mouth I extracted some few temporary teeth. The child bled profusely for a short time, but it soon ceased. One Saturday Mrs. L—— came to have one of her own teeth extracted, the second molar of the upper jaw. The tooth was small and the fangs short and thick, and she suffered very little from its removal. There was some bleeding, but not to any great excess. Mrs. L's person harmonized with her teeth, she was short and thin, somewhat pale, but with a good head, and an active nervous system. When she left, she said smilingly, "I am better off this time, than I anticipated." To me it was either a marvellous expression, or else a mode of showing her gratitude for the relief she had experienced. About eleven that same night, the mystery was solved. I received a note, written in pencil, telling me that Mrs. L—— had been bleeding all day, and was still doing so in great quantities, and requesting I would send

something to stop it. Before an answer could be returned in the usual method of conveying it, I was at the residence, and in the bed room of the lady. She looked as she laid on the bed, like a piece of exquisitely white sculptured marble. Her hands and feet had already the coldness of death, and her voice was too feeble to hear! Though somewhat agitated at their neglecting to send for me before, I have reason to be grateful for my presence of mind. Putting my hand on her wrist, I could not perceive the slightest movement of her pulse. I called for wine, some sherry was brought to me. With my hand still on her wrist, I ordered the servant and her relations to raise her up a little, and to continue to give her wine until I bade them stop. She had had the sixth glass, when to my satisfaction, the pulse became manifest, and then, and then only, I turned to stop the bleeding, which the ordinary styptics failed to do. So I dipped a piece of cotton in the bi-chloride of zinc, undiluted, and pressed it on the bleeding vessels. The pain was great, as the tendency of this preparation is to destroy the bleeding vessels. She recovered and improved in health, and was often afterwards with me, as a patient, until her departure.

I have been rather particular in the details, in order to point out a fact, that if on my arrival, I had attempted to stop the bleeding, when the heart scarcely acted, in all probability a collapse would have taken place, and the patient would have died under my hands.

It may be worthy to note in this place, what has been hinted at before, that in all cases of this kind, which are recorded, incontestibly prove that it is hereditary. Such was the fact in cases Nos. 1 and 2, and also in the two now to be narrated.*

CASE 3.—One day during the summer of 1848, a lady, Miss W——, applied to me to extract for her a molar tooth on the lower jaw, and as she seemed very nervous on the subject, I endeavored to impress her with the fact that it would be comparatively a trifling operation, and that of but short duration. She replied, "I am not alarmed at the amount of pain, but for

* See also a case at the concluding portion of this paper.

the after consequences, as I am one of a family of *bleeders*. For whenever I have been forced to undergo this, or any even trifling operation, the surgeon has hitherto had a great amount of difficulty in stopping the frightful hemorrhage." After thanking her for the information, and assuring her that I would take means to prevent the consequences she anticipated, I extracted the tooth. The flow of blood was terrific, and although her features became pallid, and a clammy perspiration came over her, which is often a premonition of a state of *syncope*, yet the bleeding continued with great impetuosity. I therefore dipped small pieces of cotton wool into the bi-chloride of zinc, and forced them down the alveolar processes to the bottom of each cavity, and although a painful operation, by its immediately corrugating the lacerated arteries, the hemorrhage was arrested. But the plugs were permitted to remain with the cotton pressed down tight on them. The lady left me in good spirits, and continued, at my request, to retain the plugging for three days. At the end of that period, I removed them, and no ill consequences ensued.

In this instance, there was still less than in the preceding ones, to indicate such a peculiarity. The lady seemed in health, probably somewhat dyspeptic, but with that enduring temperament—the nervo-bilious.

About two months afterwards I was sent for to attend a brother of the above patient, the Rev. —— W——, and when I arrived at his lodgings, I found him in a state of great agitation as he had the family tendency, and said "that he dreaded the operation in consequence of the sufferings he endured on the last occasion, when he had had only a part of a tooth extracted. That he had been obliged to be three weeks under Sir Benjamin Brodie, and that at last that celebrated surgeon had to tie the carotid artery." It was, therefore, with no very pleasant presentiments, that I undertook the task—the detail being as follows.

Case 4.—The Rev. —— W——, about twenty-four years of age, a nervo-lymphatic temperament, with some slight mixture of the sanguineous. He was curate of a very large parish,

and had, during his clerical labors, caught some epidemic disease, which had reduced him very much. Besides which he had not long been married. So that he had suffered from mental excitement of various kinds, and had visited Brighton to recover his health. I extracted the tooth, a molar, in the upper jaw. It was about four o'clock on a Saturday afternoon. When it was out, the blood gushed forth in jets, so that in the first instance, as he was in such an irritable state of mind, I tried a strong styptic with compression, without having recourse to the more severe remedy, and the bleeding seemed stopped.

About 12 o'clock, that same night, I was aroused by violent knocking, and ringing, at my street door, and a messenger bellowed forth, as if he himself had been doomed to immolation, "the Rev. —— W—— is bleeding most profusely, and if you dont go immediately he'll die." When I entered the chamber of my patient, he was in bed, with a dressing gown on, and his head over a hand-basin, literally pouring out blood, which seemed very thin, but of a dark color. His face was flushed, his head hot, and his eyes bright and with a wild expression. Having given him an assurance that I would stop the bleeding, but that in doing so he would suffer great pain. He replied in a hurried, and rather weak manner, "*Pray then do it.*"

I then adopted the plan, dipping the cotton in the bi-chloride of zinc, and pressed it down on the bleeding vessels. This occasioned him great agony. He jumped out of bed, railing like a maniac, but I forced him back again to complete the plugging. The bleeding ceased. And after remaining all night with him, he was quiet, and had had no return of the hemorrhage. Dr. Peckford, a gentleman of high professional qualifications, attended Mr. W—— at the same time, and he suggested that he should have ice to his face, and only take cold slops, so as not to disturb the mouth by the motion of chewing food. The next and following days he continued without any return of the bleeding, for the application had caused a large clot to fill up the space of the tooth formerly

and the one recently removed; but on Monday night I was again called up, "as he had recommenced bleeding," so said the messenger. On my arrival, I found him in the old attitude in bed, holding his head over a basin, in which some water was tinged with a small quantity of blood. I told him that this was indeed, "a false alarm," and on looking into the mouth, there was the clot inside, but he had rubbed the cuticle of the gum on the one side of it, and abraided the capillaries, but I painted the surface with a diluted solution of the bi-chloride of zinc, and immediately stopped the hemorrhage.

Assured by his medical attendant and myself that there was not any probability of a recurrence of the dangerous symptoms, he remained in bed quiet, taking the fluid diet, and he rapidly improved afterwards, the mouth healed, and under a tonic course, he recovered his health.

It may not be altogether gratuitous to inquire if we derived any *data* from the above cases, as to the chemical condition of the blood, to explain the phenomena, even if we cannot speculate on the causes of this peculiar affection. We may remark, incidentally, that in all the cases we have seen, there seems to be an abnormality of the blood, which appears to have an insufficiency of fibrine, and thus, for this reason, it does not form a *coagulum:* and this incapacity to form a *clot*, (which is nature's plug for lacerated and bleeding vessels,) may, in some measure, account for the excessive hemorrhage. And from the color of the blood, (though we had not the opportunity of proving this by any microscopical observations,) this would appear to confirm the latter speculation, the color being similar to the blood of persons to whom ether has been administered, for the purpose of producing anæsthesia, in which case the blood corpuscles are said to be ruptured. But whether, if such is the case in the excessive hemorrhage after the extraction of a tooth, it may still be either an idiopathic condition or the result of the nervous terror of the patient. But which, with our present experience, cannot be decided.

In the article "Blood," in Dr. Parr's London Medical Dictionary, (1809,) he says, "We find in scorbutic cases, and in

some species of typhus, as Dr. Lind and MM. Parmentier and Deyaux have shown, that tenuity of blood is not occasioned by agitation,* but in the first, by a probable increase in the proportion of neutral salts with a deficiency of oxygen, and in the latter by a diminution of the proportion of fibrine or albumen; *a change which seems to be the constant consequence of debility*."

That the important remark of Dr. Parr, which I have marked in *italics*, is worthy of being attended to, is manifest by the case of the little creature with the whooping cough. The stream of blood from whose lip being thin and of a rather darker color than arterial blood, showed a deficiency of oxygen; and in the instance of the Rev. T—— W——, it will be remembered, that after the vessels of the alveolus had been destroyed, and he injudiciously rubbed the gum near it, that even the small capillaries continued to bleed to a degree sufficient to excite the terror of the patient. So that there was a deficiency of fibrine, &c. inducing a fluid of the state of the blood. *(a)* It seems that the bleeding tendency in some of these cases, may arise in part from the extreme thinness of the arteries.

We will now cite a few incidental opinions on this subject, in order to show how indefinite the statements are, and how comparatively useless in treating similar cases.

* Dr. Parr is refuting the notion that fluidity in the arteries is induced by the motion within them.

(a) Under the head of "Hemorrhagic Tendency," the late excellent surgeon, Samuel Cooper, in his Surgical Dictionary says, "there appears to be an extraordinary tendency to profuse hemorrhage from very slight injuries." An instance of this kind has been recorded by Mr. Blagden, when a fatal hemorrhage arose from the extraction of a tooth. The patient was twenty-seven years of age, had had a tooth extracted when a boy, in consequence of which operation the bleeding continued twenty-one days from the socket, before it ceased. A very slight cut in the hand was also followed by an alarming bleeding, which could not be stopped by pressure, styptics or ligature, so that it became necessary to apply the *kali purum*, which succeeded. On having another carious tooth taken out, a profuse bleeding followed, which resisted the effects of styptics, caustic, and every means adopted to stop up the socket. The actual cautery was tried in vain. The dangerous condition of the patient seemed to leave no other

After the various means had been found futile, it appears to me, that though highly painful as the operation of destroying the lacerated arteries by the bi-chloride of zinc may be, yet when the excessive bleeding occurs after the tooth is extracted, that it is worthy of trial, and in my own cases never failed.

Mr. Cooper adds, "Several instances are recorded in which the males of a particular family had this hemorrhagic tendency, so that whether the bleeding arose spontaneously, or from a wound, it could not be suppressed, and their lives were lost." The author then gives references to the following works: Dict. des Science Med., Art, Vas, Rares; London Medical Repository, vol. iii, page 60; Krümer's Versüchen Einer Physiologie des Blutz, page 115, Lepzig, 1823; Journal des Progres, pour 1828, &c.

There was also a case reported in vol. 5 of the Medical Gazette for 1830, under the title "Hemorrhage from the extraction of a tooth, by John Kendrick, Esq., of London, in which he details the history of the case, which this summary embodies. "He was requested to see Mr. P——, a remarkably fine young man, of twenty-three years of age, who the day before had had a left molar of the upper jaw extracted by a dentist, a portion of the alveolar process having been removed with the tooth, and left a rather frightful cavity. On his arrival the patient was bleeding copiously, and he had done so for five hours previously to his seeing him. The cavity was filled with *coagulum, on the removal of which, the blood flowed with greater rapidity*—per saltem, which clearly indicated it proceeded from an artery."

This, I should have called bad practice, as we have seen that the *clot*, or coagulum, forms the natural plug to the bleeding vessels. Mr. Kendrick, however, informs us that he stopped the hemorrhage with the *tinctura ferri muriatis*, but that

resource but that of tying the carotid artery, which was done by Sir Benjamin Brodie. But even this proceeding failed to arrest the hemorrhage, which proved fatal." [From the Med. Chir. Trans., vol. viii, page 224, London, 1817.] Vide Cooper's Surgical Dictionary, page 697, seventh edition.

it afterwards recommenced with redoubled violence, and the patient appeared in a perilous condition, but after trying other means, he finally succeeded in stopping the bleeding with lint dipped in strong alcohol."

The paper, which is very interesting as the record of a case, concludes thus, "An extraordinary feature is, that the patient was one of a numerous family in Norfolk, who in almost every instance, when a tooth had been extracted, they had been more or less subject to violent hemorrhage."

We cannot help remarking, that the particular conditions of health, seem not to offer any solution to the enigma of those special bleeding cases. Nor are we aided by the temperaments, as the *nervous*—the *nervo-lymphatic*—the *sanguineous*—and the *lymphatic*, are all liable to this peculiar diathesis. It must, therefore, be a matter of great importance, when it is discovered that not a styptic in general use can be depended on, that we may arrest the dangerous hemorrhagic flow with certainty by destroying the vessels with the bi-chloride of zinc.

In the lectures of the late excellent Joseph Fox, (who was the first English dentist whose practice was based on anatomical, physiological and pathological *data*,) merely incidentally alludes to the subject of this Essay. He says, "sometimes, after the extraction of a tooth, a considerable hemorrhage continues, the artery belonging to the tooth does not contract in form, being of a large size, a *coagulum* sufficiently to restrain the flow of blood—hence great quantities of blood may be lost. The best plan or mode of stopping the hemorrhage is by the application of pressure: a very fine piece of lint or cotton, dipped in turpentine or alcohol, should be pressed into the socket, over which a large compress of lint should be laid, which may be pressed firmly by the finger, and in closing the mouth by the teeth of the upper jaw. In this manner a hemorrhage may be soon restrained. Little or no benefit is derived from washing the gums with styptic remedies, as they cannot act on the mouth of the bleeding vessels, and therefore are ineffectual."

Bell, in his work "On the Anatomy and Physiology of the Teeth," makes some fine general remarks on this subject:

and though he has, in his treatise, frequently deprecated some of Mr. Fox's views, yet it will be obvious, that although he offers some recommendation in the treatment of this form of hemorrhage as original, it must be confessed that *his* plan differs little from that incidentally given by his predecessor. I shall quote a few passages.

"A very severe and dangerous hemorrhage occasionally follows the extraction of a tooth. That this is, in some cases, the result of a hemorrhagic tendency in the constitution, or in other words, of a want of contractile power in the coats of the arteries, seems clear, from the circumstances that some persons never have a tooth extracted without a considerable hemorrhage continuing for a long time afterwards." After speaking of many fatal cases being recorded, he adds—"When it is recollected that the bleeding vessel is situated at the very bottom of the alveolar cavity, it is astonishing that the following simple method of applying pressure in immediate contact with it, which I am about to recommend, should long ago have been universally adopted. I have seen very many severe cases, and some of which the patients had nearly sunk from loss of blood, but I have never seen one in which I have failed to stop the hemorrhage in a very few minutes, by the following process."

I must, however, tell Mr. Bell, that in the cases I have narrated, and in others I could have given, the flow of blood had been so excessive as to defeat all such deliberate modes of proceeding. His plan shall now be given. "*The bleeding alveolus is first of all ascertained, the coagulum carefully removed from it, and the interior cleansed with a bit of lint, and by rinsing the mouth with warm water.* A strip of lint of sufficient length being torn off, one extremity is then introduced by means of a curved instrument, and gradually pressed down from time to time, until it reaches above the cavity, then a compress of lint is laid upon so thick as to be pressed upon by the antagonist teeth. The mouth is to be carefully closed, so as to retain the plug in its place, and kept constantly and firmly pressed against the bottom of the alveolar cavity."

We have said before, what we now repeat, that the coagulum is nature's plug, and hence in even such an extreme case as that of the Rev. T—— W——, I did not attempt to clean out the socket, or to wipe it out clean with lint, because the flow of blood was like a rapid running tap of water.

There seems to me little novelty in the plan recommended by Bell, because no one, except a dolt head, would attempt to press on a large and broad piece of lint into a narrow cavity: he would be guided, even the first time, by the process used in stopping a tooth with gold. Simple pressure may answer in some cases, as I recollect that a student in one of the London hospitals adopted a very novel, yet efficient plan for this purpose. A man had had a tooth extracted. The bleeding was excessive. Every kind of styptic then in general use was tried, and also the actual cautery, but the hemorrhage could not be stopped. The patient was sinking when a student of the hospital, with great presence of mind asked for the tooth. There was some trouble and delay in finding it, and when it was obtained, he replaced it into the alveolar processes of the patient, urged him to forcibly close the jaws together, and the bleeding vessel was thus effectually closed.

It appears that much of the obscurity in the peculiar affection we have commented on, arises from the phraseology, in which it is described, being so indefinite. It being confounded with other diseases; for example, in vol. 1 of the Lancet, for 1844, page 423, there is a case under the title of Hemorrhagic Diathesis, which proved to be "spontaneous bleeding from the scalp," and vol. 2, page 70, for 1845, there is a case of true purpura hemorrhagica, under a similar announcement.

In conclusion, if our essay, imperfect as it is, will tend to stimulate every dental practitioner to note all particulars of such cases; the state of health—modes of living—occupation—temperament—locality—and the chemical condition of the blood, and whether the affection was idiopathic, and whether it was hereditary, we might ultimately obtain so many valuable facts as to enable some future writer to give the pathology of the disease.

ARTICLE IV.

Review of Dr. Leslie's Report of the Proceedings of the last Meeting of the Mississippi Valley Association of Dental Surgeons. By JAMES TAYLOR, M. D., D. D. S. Cincinnati.

MESSRS EDITORS:

IN the January No. of your valuable Journal, we see a very lengthy article, purporting to be from one Allen Leslie, giving, as he says, a report of the discussions and proceedings of the Mississippi Valley Association of Dental Surgeons, at their last annual meeting.

As we have no knowledge of any individual of that name, we refer to the initials at the close, which are more significant, and enables us to determine with some degree of accuracy, who the author is. A. M., we believe, stands for Master of *Arts*, and L. for ——. We of Cincinnati, and especially of the society, know the application of the initials.

As the "report" does great injustice to the association, the proceedings of which your reporter has trimmed, garbled and distorted, to suit his own views and purposes, and as it has been sent to the Journal "that it may have a wide circulation," we feel it a duty we owe the association, to correct some of the gross misrepresentations with which it abounds, "so that the profession may know *through the pages of the Journal*, what we are *doing* and *saying* out here in the west." To review the entire "report" in detail, would take up more space in your Journal than would be profitable or perhaps interesting to your readers; we shall, therefore, not pretend critically to examine the gentleman's elaborately written "report," and speech or speeches. The first appears to be a very nice little "scientific" affair of only five or six pages, but the second shows much more bottom, for it fills some 20 pages of the "report," and indeed has a *tail* attached which covers some two or three more.

We feel assured that the members of the association will be much amused and edified with the splendid exhibition of talent the gentleman has given us. We were not aware, before, that any thing so exceedingly rich and eloquent had come off at our recent meeting. We might suppose that the most of this occurred during our absence from the hall, and that the president was taking his afternoon siesta in the chair, for he assures us that *much* of the "report" is news to him: but if we had been absent, we could not have taken the personal and active part in the drama assigned us by your reporter. You can, therefore, appreciate the very embarrassing circumstances under which we labor in its examination. First, it appears that we expressed ourself as unable to explain, on "scientific principles, the mode upon which the partial vacuum in the chamber is obtained." "We would not give a full explanation of the *thing*." We believe we did express a doubt whether we should be able to enlighten the learned gentleman on this subject. We still think as we did then, that a perception so astute as to see no passage for air through a hole made in wax or plaster, to the arch of the mouth, would be difficult to enlighten on this or any other subject of the like character. The passage of air was not expected to "immediately" loosen the impression. If there should be a vacuum in the impression at the center of the arch filled with "water or air," this would escape, so says your reporter. Truly, here is a discovery, and it is given with most commendable liberality. The air can get in around the border, and yet to get in at these little holes in the center, is most astonishing, and more than your reporter "can understand." Is it any wonder that we should feel unable to explain the "*thing*" on "scientific principles." We are glad, however, that your reporter has done this "on scientific principles," and trust your readers will not fail to profit by it. We, however, doubt very much whether a majority of our patients would be content with a plate which "but little more than held the weight of the operation and the pressure exerted by the tongue in articulation."

We next find ourself offering to bet, or forfeit, fifty dollars on the success of a first impression with plaster. We believe

we did speak quite positive in relation to the success which generally attends our impressions in plaster; but as we universally refuse to bet, we have no knowledge of tempting your reporter in this way, as we failed to enlighten your reporter upon our method of taking impressions at that time; we would state that the plaster carried to the roof of the palital arch on a spatula, though thicker than that which we have in the cup for the impression; requires but little pressure to adapt it to this part of the mouth; far less, indeed, than wax, which can be successfully used. We do not always use salt with the water in mixing the plaster, but only when it does not readily set without it. In this connection, we find our friend Dr. Goddard called up before he had his lesson, he therefore "did not know anything about it," we hope he will be better prepared next time.

We pass on now to that which has engaged the especial attention of your reporter, and fixed his indignant eloquence—that is, the resolution offered to award to Dr. Allen, a gold medal. Here he labors to make an entirely false impression, as that, the president "undertook immediately to take the vote," and thrust it through without an opportunity for discussion, which would have been accomplished if it had not been for the noble daring of one member (the "reporter.") This we say is not true in either respect. The president, as in all cases, called the attention of the society to the resolution, and your reporter made due haste to be first on the floor to discuss the question, and *who* of your readers would doubt his having held it more than all the rest; your reporter has apparently a great fancy for the word, "immediately." The impression is to loosen "immediately." "The president "immediately" proceeds to take the vote, and we say your reporter "immediately" takes the floor, but finding himself unlike the greyhounds, ready for a hot pursuit on an empty stomach, "immediately" moves an adjournment until after dinner.

There was nothing which occurred either before or after dinner which could, by an unprejudiced individual, be construed to warrant the supposition that the resolution, as proposed,

would be hastily, or even at all, forced through the society. The manner in which it was seconded showed a different spirit, as it was done with this remark, that "we would second the resolution to bring it before the society," meaning, of course, Dr. Allen's mode of fastening artificial teeth to plates, &c. After dinner we wished to offer a different resolution as a substitute for the one offered by Dr. Goddard. To dispose of that we offered to withdraw our second. The chair and all the members present except your reporter assented to this. Either ourself or the president suggested that courtesy to Dr. Goddard required that we should wait until his return. After his return, the subject (Dr. Allen's improvement) was referred to a committee of three, consisting of Drs. Goddard, Taylor and Leslie; a meeting was appointed for the committee to confer together and prepare a report to be submitted to the society. The committee met in the evening, examined the specimens, and applied the tests, in which they were to lay till morning. The committee was then to meet again and prepare their report before the society convened. This meeting, your reporter did not attend, but prepared a report for himself which was never shown to the balance of the committee. The other members prepared a report which was submitted to your reporter the first opportunity. They reported that they had subjected specimens of work put up by Dr. Allen to satisfactory tests, as to its strength and capability of resisting acids, &c., &c., and thought it possessed peculiar advantages over the ordinary method of setting teeth, and recommended the following resolution:

Resolved, That Dr. Allen deserves all commendation for his indefatigable exertions in thus developing and making available, a new and important improvement in mechanical dentistry, and that we recommend this improvement to the profession as worthy of their attention.

Now, what is the just inference from this as to the view the society took of Dr. Goddard's resolution? evidently, that the society was opposed to it, nor was this opposition brought about by the eloquent discussion of your reporter, because

cause he had not yet *delivered* himself—only the first symptoms of labor had manifested themselves, none of those violent *throes* and *struggles* which characterized the future progress of the laborer had made their appearance. The attending physicians had as yet no just grounds of anticipating a prolonged and difficult accouchement, hence, ergot, blood-letting nor any such remedies had been thought of as necessary for the case. Only the usual number of sheets had been provided as no *flooding* was then anticipated. The future development of the case shows the importance of proper prognosis and early attention to *bad symptoms.* We presume if this had been attended to aright in this case, the violent *afterpains* might have been prevented. Let it be borne in mind, that the above report and resolution furnished the occasion of your reporter's wonderful onslaught. The subject of patents was not at any time properly before the society, and your reporter was several times called to order by the president during the speech he *did* make as discussing a subject not before us ; your reporter says that the "necessity for his speech only became apparent a short time previous to the "this morning's meeting," his report and speech must therefore have been prepared during our walk of some three or four squares, from Dr. Goddard's to the hall in which the society met; let this be, however, as it may, the society met in September and January—we have the full grown *genius* a time long enough for *delivery* if not for *conception* and *gestation.*

We have first an array of extracts in relation to the subject of patents, and our remarks are quoted much as an infidel would quote scripture. It appears that on a former occasion we expressed ourselves against patents, except, indeed, as applied to the mechanical arts, that while "a piece of mechanism might thus with propriety be patented, yet a principle of that science which claims for its object the amelioration of the ills of life, should not be thus trammeled." The sentiment, however, was more fully expressed by the remark "that no agent for the cure of disease should be thus trammeled." We know not that our present sentiments could be more fully expressed

than in the above remarks, and there is scarcely room for a doubt as to our practice; yet, your reporter so strenuously urged this as fully committing us against all patents, that it was necessary at the time to correct him.

The resolutions offered by our brother, Dr. E. Taylor, at the second annual meeting of the association, did not entirely meet our views, hence the qualified remarks we then made, and which your reporter construes very different from their true meaning. The second resolution offered by Dr. E. Taylor at this meeting, postponed further action on this subject until the next annual meeting, as we felt at that time not prepared to go the length which some felt it necessary in this matter. The subject was not brought up at our next annual meeting, and, indeed, has never been disturbed since, unless when your reporter disentombed the monster and roused the association from its long and dangerous slumber. Your reporter was not then a member of this association, this may account for his indiscretion in arousing such a dangerous animal. About this time, we are told he was very familiar with his lordship, thought him very beautiful, and even visited his great cage at Washington city, and offered an oblation at his shrine, which, however, did not prove very palatable to his epicurean taste. The reader may learn more of the *style* of this *dish* before we have done with the "report."

The subject of patents has ever been a great *bugbear* to the medical profession; we think this is owing to an imperfect understanding of the subject, identifying it with quackery, charlatanism, &c., &c. We propose, therefore, taking a hasty view of this subject. We have, first, a law of congress, which gives encouragement and protection to the patentee. This law appears to have been especially intended to foster and encourage a spirit of improvement among manufacturers in the mechanic arts, yet embracing in its ample folds science in every department. Are we prepared to set this law at defiance, by thrusting from us those who seek its protection? Are we prepared to throw aside every thing in the shape of an improvement in the arts, which bears the impress of a patent?

What is the difference between a patent and a copy-right? Is the obtaining of a patent, quackery? These questions deserve some notice, and we shall notice them briefly, as proposed.

In relation to the first question, we would remark, that all the laws of the land should receive our support, unless they should cause us to violate a moral obligation or law, which has a higher claim to our observance. The medical profession, regarding the cure of disease as of the first consequence, hence, in assuming the duties of the profession, they impose upon themselves a moral obligation, which shall consult first the preservation of life, and it has thus become a settled principle in medical ethics, that all knowledge essential to this great object, should be free. That all remedies for the cure of disease, should become the property of the profession. The claims of humanity here step in, and demand of the high minded professional man, a sacrifice of what the law recognizes as his own property. This, for the good of the public, and the honor of the profession, of which he is a member, he cheerfully does. This compliance constitutes one of the noblest traits of the medical profession, of which we consider dental surgery a part and parcel. Has compliance, however, generally extended farther than this, and should we demand more? If so, we must at once blot out the record of every patent. We do not believe the public, or the profession themselves, are ready for this. We do not believe that the intelligence of the nation is prepared for it. The medical profession, as a general rule, have not done this. If any of them make a discovery or invention in science or art, the patenting of which cannot, in any way, effect the general and successful treatment of disease, they hesitate not to avail themselves of its benefits. And why should they? They have rights in common with every other good citizen, and none pretend to say that he shall not avail himself of them. We are satisfied the profession would be content if no departure was ever made from this rule. We doubt not, the records of the patent office would show a full proportion of patents, as belonging to the medical profession. We would that none of them were affixed to remedies for the treatment of disease, and

notwithstanding the reproach thrown out by some in the medical profession, in regard to dental patents, yet dental surgery aside from mechanical dentistry, will compare favorably in this respect with any other department of the healing art. We scarce have a patent medicine in dental practice, and in mechanical dentistry we would fail to compete with general surgery. We do not allude to this, out of any invidious feeling, nor to, in the least, extenuate the patenting of remedial agents, but to show that the medical profession stands in the same predicament as the dental, and is not prepared to cast the "first stone." And it is, perhaps, far more reprehensible, for in dentistry, this only effects the substitution of an organ which disease has already destroyed, while in the other, it often applies to a mechanical appliance which is designed to preserve an organ, or perhaps, life itself.

The question comes to simply this: is the obtaining of a patent for any thing, justifiable? If so, where is the line to be drawn? If we confine it to manufactures and mechanic arts, it is still not excluded from medical science, for this, in her efforts to combat disease, lays her contributions on science and art. She grasps every resource which an all-wise Providence has opened to her persevering industry.

We are aware, that although the medical profession have generally reprobated the use of patent remedies for the cure of disease, yet this has not so generally been applied to those mechanical appliances which art has contributed for the use of the surgeon. It may be, that too much latitude has here been allowed. They have, at least, set the dental profession an example of charity and forbearance; and as *they* have not thus seen fit to thrust the patentee in the mechanic arts from them, *we* scarcely feel it our duty to set *them* the example. Are we prepared to throw aside every thing in the shape of an improvement in the arts, which bears the impress of a patent?

Our first duty is to consult the greatest good of our patients, for this we strive to perfect ourselves in every department of our profession, and he who brings not into requisition all which is available in our science for the good of his patients, has but a poor appreciation of the duties of a dental practitioner.

This principle, which urges us to seek the greatest good of our patients, is the very foundation of excellence in the profession. We therefore would not throw aside the patent article because it was *patented*, but use it, and if possible, improve it.

In mechanical dentistry, we feel that no patent which lays not a prohibitory duty upon us, shall keep us from every improvement which has or may be made in this department. Thus, if an easier and better method of inserting teeth is devised, we shall adopt it as soon as we can. We do not believe the old way in every thing is the best. We wish to try every thing which holds out good prospects of improvement, and hold on to that which in our hands proves best.

What is the difference between a patent and copy-right?

A patent right makes the discovery or improvement of an individual, his property, and protects him in the use of it. It makes, indeed, a species of property out of knowledge. It secures to the patentee, for a limited time, the product of his mental labor or mechanical skill. As medical men, if this throws no obstacle in the way for the successful treatment of disease, no objection can be urged.

A copy-right secures to an individual a right of property in his knowledge. It makes, as in the other case, knowledge a species of property, and the whole object of the law of copy-right, is to secure to the author* the use and benefit of his knowledge. In both cases, this is really the product of labor, both mental and physical. And the only difference we see in the two laws is, that the law of patents is made to secure to the inventor for a limited time, the practical application of his knowledge, where it presents itself in such form as not to be available by copy-right.

In both cases, the public is taxed, securing to the author or inventor, a remuneration for his labor. If we were to decide on the amount of pecuniary benefit, we should, as a general

* We use the term author, in contradistinction to that of patentee. The former, being applied to written productions, secured by copy-right. The latter, to mechanical improvements or productions, secured by patent right. Both are truly *authors*.

rule, accord to the author who secures himself by copy-right, a much larger remuneration than the patentee obtains. We think there are but few patent rights which pay as well as Macauley's copy-right of the History of England.

We know there is here a distinction which has often been urged, which is, that the publication of an author becomes, so far as knowledge is concerned, public property. That all which is available for public use, is soon disseminated through various channels. This, to a certain extent, is true, and so far, an author claims more liberality than a patentee; yet, is this not more in appearance than reality? With all this liberality, we doubt whether he would suffer his works to be republished by any one, with impunity. He suffers quotations and notices to be made through the public prints; and why? because that which he has for sale, is thus introduced to public notice, and he expects to be benefited thereby. The patentee does the same, and you may even minutely describe his article, tell how it is made and used, and he cares not; when patented, it is no longer a secret. The author and he have both parted with their secrets.

Is the patenting of an article quackery? if so, it is sanctioned by the highest authority of the land. It receives its sanction not merely from a state authority, but has been considered of such importance that congress has reserved this privilege, and, if we mistake not, all civilized nations that have any pretensions to intelligence and progress, have their patent laws sanctioned by the highest authority. If, therefore, it is quackery, it claims an honorable paternity. But we regard it not as quackery or charlatanism, and we refer your reporter to the following resolutions of our society, which *was passed* at its second annual meeting.

Offered by Dr. E. Taylor:

"*Resolved*, That any member of this society who shall extol his own *peculiar* merits over those of a fellow practitioner, or offer his services at lower rates than is common among the members of the profession, among whom he operates, through the public prints, or use any secret nostrum, (unless pledged,) prior to the present time to maintain secrecy, shall be liable to expulsion from this society."

This resolution embraces what may be regarded as quackery. The use of secret remedies, all efforts to obtain business other than on fair and honorable terms of merit; all assumed excellence in operations; all puffing of self to the prejudice of the profession. Your reporter will find that the above resolution *was adopted*, and perhaps he would find enough which *had* been done to reflect on, without hunting up that which was not done, and using this as authority. But we find that the resolution which was offered at the same meeting of the society, which was "that any member of the society who may patent any instrument or improved mode of practice, may be subject to expulsion from the society." This resolution, which was first laid on the table, and next day withdrawn from the society by consent, and the gold medal resolution of the last meeting, which was also first thus withdrawn, and then referred to a committee, and in that committee also withdrawn. These resolutions offered, but not received or passed by the society, is of the utmost consequence, and shows the *exact views* of the association, so thinks your reporter. True, they do; without your reporter's *construction*. We refer him to the twenty-third chapter of Matthew, and twenty-third verse, and he will find that there was of old, a *certain class* which also omitted the "weightier matters of the law."

We have given, as we think, a fair and candid construction of the questions suggested; one which, as a profession, we may be able to abide by, and which cannot, in the least, effect its dignity and usefulness. Any other course would cut off from our intercourse, many of the most prominent in the profession, whose patents effect not, in the least, the curative treatment of dental disease, or any other, and who now offer the profession the use of their improvements on very reasonable terms.

We are free to confess we regard the disposition to patent every little improvement in instruments and appliances for use in mechanical dentistry, as illiberal, yet, so long as it is restricted within the bounds we have prescribed, we shall not complain. There are many improvements coming to us yearly, without any restrictions of the kind, and we are glad to think

our dental periodicals are diffusing much useful knowledge which is free to all, and covered by no copy or patent right.

We are accused by your reporter, as having changed our views on this subject. And we perceive he has, with all the consequence of a village pettifogger, cross-examined us on the subject, and although he makes us say things we never thought of, still he is not able to make out a clear case. We did remark, however, that our views had, perhaps, undergone some change, yet not to that extent he would make the society believe, and referred him to the remarks of ours he had already quoted, to show that we had always thought "*a mechanical improvement might with propriety be patented,*" and if we had changed at all, it was merely in the limits to which we would allow this to go, so far as the profession is concerned.

We did not, before or out of the society, contend or say "that Dr. Allen should be granted the right to patent," and the whole of your reporter's charge in the paragraph on page 247 of Journal, commencing with the above quotation, is incorrect, except one sentence, which is we regard the "improvement as an important one."

We remarked that we were not discussing the subject of patents—that we regarded it as not properly before the society, that the majority report did not recommend or say any thing of it, but merely reported on the merits of the improvement presented by Dr. Allen. Your reporter knows that the society had not time to enter into a discussion of this kind. Your reporter seems to think there is very little of dentistry, except that which is mechanical—that when this is gone, the "stock, lock, barrel, and even half of the flint is gone." Now, sir, we have always regarded this view as the greatest curse of our profession ; it is this which retards the progress of dental science. The great evil we are contending against in dental education, is this *idea*, that dentistry is a mere mechanical art. We know there are those in the profession, whose practice is mostly in this department, yet this does not do away with the necessity for a more enlarged mode or sphere of practice. And we know there are many in the profession who regard this

as a mere appendage to surgical dentistry, and not half so important.

Your reporter, really, in his use of the Irishman and his Dutchman, (Steemer,) makes himself very amusing, and we only wonder that the society could retain its gravity at the exhibition which the Scotchman made of these very opposite characters. It so happens, that "we in Cincinnati," know something of the tryo, except the Irishman, and from the sample exhibited, we suppose he shot himself with the "half of a flint" which he found in his possession, and was duly buried by the others. We know not if the Dutchman has been able to advance any other in his ART, as your reporter *claims he has Dr. Allen*. We are told he made one other effort, and failed. From this, we may infer that Dr. Allen was a good and apt scholar, or the Dutchman has forgotten his method of teaching.

We saw some specimens just before the meeting, which convinced us that the student had got in advance of his preceptor. "We in Cincinnati," we presume, embrace a few besides your reporter, if so, we dissent from him as to the time when Dr. Allen "first showed specimens of his work."

Your reporter mistakes, we did not *say* we were "shown the stethiscope," it was merely described to us.

Your reporter takes great credit for having, as he supposes, stopped the vote on Dr. Goddard's resolution. He says, "at this juncture, *I arose* and *arrested that act*." Truly he makes a very Leonidas of himself, and how nobly he reports the battle. Drs. Goddard, Allen and Taylor's weapons fall as harmless as "snow flakes." How flat, tame and insipid their speeches appear, but the sword of Leonidas at every blow deals death and destruction. Tis true, Dr. Taylor knows how to second a resolution; this he does "pretty promptly," and then the President, "without a minute for discussion, was proceeding to take the vote." For shame, Mr. President—why such haste—did you not know that *Dr. Leslie* "is desirous to discuss the matter?" That he has a speech of full twenty pages to be delivered of, and also an *after birth* of two or three pages more. Now, sir, a man of your gravity and age, with over twenty

years practice, should know that such cases cannot be postponed, at least longer than till "after dinner," even then we should take a "hasty plate of soup." We are rejoiced, Mr. President, to know that you had the humanity to wait on the gentleman. The dental precosity thus brought to light, might have died in *utero*, and the dental world been deprived of this wonder of the age.

But we seconded the gold medal resolution, and hence, *nolens volens*, must be for it; by the same rule, the minority report would have died in the hands of the committee. It happens, however, to be made of sterner stuff, and is harder to kill than the Irishman, for it cannot be *expunged*. We will here observe, that the mover of the expunging resolutions, designed to have it apply to the minority report, and every thing on the subject, but the report which was adopted as the sense of the association. We are, therefore, right, in not printing this report with our proceedings. It may have been handed to us with the other documents, if so, it passed with them into the fire, when the minutes were published. We offered, however, to publish the report, if your reporter would furnish a copy—he has not done so, and said it was of no consequence.

We are censured for not having shown the majority report before we had assembled in "the hall." Had your reporter met the committee in the morning, at the appointed time, he would have seen the report. As it was, he was in the same predicament with the majority of the committee. It appears that both had a report, and that your reporter did get to see that of the majority before we had reached the hall in which the society met. This is more than the majority can say of the minority, for we did not see his at all, until after it was presented to the society: of this, however, we do not complain. The majority of the committee had the right to present just such a report as they saw proper; and if they thought it best to retain the original preamble offered by Dr. Goddard, the society could accept or reject, as they saw best. The committee could approve of this without approving of the resolution which was attached.

We shall not, however, as we said at first, pretend to state all the misrepresentations of your reporter. We have merely glanced at a few of the prominent ones, and these generally as connected with ourself, and in doing this, we have seen fit, in some measure, to define our position in regard to patents. This we do cheerfully to the profession, and although we may differ in our opinions on this subject with some, yet it is frankly given, and we stand ever ready to pay due deference to the views of others. But we did not think the spirit manifested by your reporter before the society, required much at our hands.

We may be told, however, that the society evaded this question at its recent meeting. The fact is, this is not really true. The question was not considered as before the society at any time, and in no shape was it, but as dragged in by your reporter just before the society had determined to adjourn. The majority report had been accepted, and if not adopted, it was merely waiting the formality necessary for the minority report.

The gold medal resolution was not acted upon or passed, because we thought it inconsistent to give a medal for that which the society did not receive. We wished to avoid the position of the American Society. We felt, however, that we could speak our minds freely in relation to what we considered an improvement in mechanical dentistry, and this we did as we think, without favor or prejudice. But, says your reporter, the society has changed its position on this subject, since its second annual meeting. This needs proof. The society then "postponed action" in relation to patents, and has ever since, your reporter's *speech* excepted. We might here assign, as a reason, (but we only name that which might be assigned,) that the society did not wish to stand alone on this subject; that it did not wish to part with several of its members, some of whom have patents, some of whom would like to have, and some of whom have tried. As the former, we may name, without being too particular, Dr. Allen; as the latter, *Dr. Leslie:* one the patentee of a plan for restoring the contour of the face, and also a new method of fastening teeth to plates. The other, as seeking a patent for *solder*. Yes, *solder*, yea, *solder*.

We have had a trip east described to us, for this ostensible purpose, and this patent should have been on the same shelf in the patent office, with the one which your reporter says, has "gone into oblivion." The patent office was visited, and the patent, *we* believe, not *obtained*, for what *reason* we know not, perhaps it wanted *originality*. It has been, however, suggested that the Dr. was driven to it by the meanness of others, and that he was afraid *we* would take the honors. O shades of dentistry, *"how our views have changed."*

One more correction, and we are done.

Your reporter remarks, that "Dr. Taylor informed members of the society, that he would, during the coming year, conduct it (the Register) at his own expense, and with this understanding it was continued under his editorship." We utterly deny the whole of this charge. The whole of it is fabricated from this one statement we made, which was, that we had no doubt but that the Register would be able to meet its own expenses this year, but that we were re-elected editor with the understanding that we should pay the cost, provided the Register failed to meet it, is without truth. The fact is, the society stands in the same relation to the Register, as it always has. We have repeatedly solicited the society to relieve us of the editorship, and hence the inference of your reporter is not only unjust, but false, that some understanding of this kind, secured our re-election.

In conclusion, we would say to your reporter, that the *samples* we have recently seen in the "report," and by *letter*, to those high in the profession, gives us but a poor estimate of his capacities as a reporter. One essential element is wanting, which is *Truth*.

ARTICLE V.

A Historical Sketch of American Dental Patents: with Remarks. By Geo. W. Kendall.

> "Tis a great fault in a chronologer
> To turn parasite: an absolute historian
> Should be in fear of none, neither should he
> Write any thing more than truth for friendship,
> Or else for hate."

Although many facts relative to the past history of the dental profession in the United States, have been recorded, one part of that history has been entirely neglected, and I have endeavored herein, by the collation of a mass of facts relating to patents granted for improvements in dentistry, to fill up this vacuum in our literature.

Until within the last fifteen years, most of the practitioners of dentistry, claimed only for it a position among the mechanical arts, and rested contented in the reputation of being *good mechanics*, and a proof of this was found in being a patentee.

The dark clouds which had so long obscured the dawn of dental science, have been partially dissipated by the rays of a more benignant planet, and now gives a foreshadowing of a glorious and brilliant future. A determination has been exhibited by many of our best and most scientific dentists, to elevate the standard of professional excellence, and to substantiate dentistry to be ranked as an important branch of the highest and holiest of sciences: the science of medicine.

Much has been done, and medical men generally recognize dentistry as a liberal profession. To show that this is well grounded, I will quote a few lines from "The American Journal of the Medical Sciences," April, 1851, which is as high medical authority as any in the world.

"American dentistry is doing every thing which the severest criticism can require, to establish its claims to the rank of a distinct specialty of medicine. The number and value of its

periodicals: the rapid succession of new standard works; and the regular and steady increase of its collegiate foundations, challenge for our brethren in this department of the healing art, the highest admiration and praise."

To merit this, should be the aim of the dental profession, and to do it, we must cut off all compromise with quackery in any of its protean forms.

Medical ethics condemn nothing more surely, than patenting any thing connected with the practice of medicine, and this example has been followed by the American Society of Dental Surgeons. At the meeting held in 1847, "C. C. Allen offered the following preamble and resolution:

"*Whereas*, one of the objects of this society is to diffuse a knowledge of correct practice in surgical and mechanical dentistry among all practicing dentists, and to give all its members the benefits of all improvements in the science, thereby elevating it to the rank of a liberal profession: therefore,

"*Resolved*, That it is derogatory to the dignity of this society, to retain, as a member, any person who has secured, or shall hereafter secure to himself, by letters patent, any improvement in surgical or mechanical dentistry.

"*Resolved*, That no man shall be considered an honorable member of this society who has secrets in his profession, or refuses to impart any knowledge or information which he may possess, on the subject of surgical and mechanical dentistry or any collateral branches, to any other member."

Which were *unanimously adopted.*

The stand thus taken did much to elevate the profession in the eyes of medical men, but the next meeting, *although* in favor of the spirit of the resolutions, thought them premature, and they were *rescinded!*

This tampering with one of the worst forms of quackery, has cast a stain upon the American Society, which even the great number of really honorable members, will find difficult to remove.

We claim for dental science the rank of a liberal profession, between which and a *trade*, let us remember that the distin-

guishing feature is, that pecuniary gain is not its principal object. Liberality is a necessary attendant on great scientific discovery, and so freely has such knowledge been disseminated, that he who now attempts to secure to himself alone the benefits of such discovery, cuts the silver cord which bound him to the *truly* scientific and honorable, and exposes his own cupidity and mendacious pretension. In no other phase, are the attributes of quackery more definitely traced; and here the inordinate selfishness of the quack stands out in bold relief; no high ambition glows in his breast, warming the ideal of his future into a hope of mental and moral greatness; on the altar of mammon, of all claim to professional regard.

The profession of medicine, and even our own, young as it is, shows the history of quackery in the lives of men notorious, and frequently from this charlatanism, who have passed from their field of action, "unwept, unhonored and unsung," leaving a memorial behind, an abhorrent recollection.

In ninety-nine cases in one hundred, patents are secured, not for the profit that will accrue from the sale of the article patented, but for the purpose of creating an impression with the public to be felt in the office practice. It is a popular belief, that the commissioner of patents, with his assistants, is qualified to judge of an improvement in each and every department of knowledge. In the library of the patent office, are a great many books relating to those branches of art, in which patents are usually taken, but not half a dozen on dentistry proper. The applications for patents for articles which the corps can judge, are so numerous, that the examiners are scarcely able to give them a thorough examination, and for every application for an improvement in dentistry, unless the claim is so glaringly false as not to deceive any man, taken at random from the crowd, the patent is granted.

As illustrations of this, I would cite the cases of patents for "vertical extractors," three of which have been granted, and not one of them is of the slightest possible practical application, and yet almost identical in their mode of action. The key was patented five times! once for nothing at all but a bend in the handle.

Another patent which was heralded as a wonderful improvement, and about which a great deal was said in Philadelphia at the time, by the inventor and his friends, was for making pin heads on the platina rivets of teeth. But to quote all valueless or filched patents, would be to leave few for further notice.

This laxity of examination at the patent office, together with the rigid laws of patents, make it almost impossible for a patentee to recover damages for infringement. Few dentists know any thing whatever of those laws, therefore apply to a patent agent who knows as little about dentistry as the examiner of patents, and the claim and specification is prepared in a *legal* form by him. In consequence, the inventor claims too much, or describes not enough. He may claim a number of improvements, of which some small and unimportant one is not his own, and then all action for infringement is at an end.

Before an inventor shall receive a patent, he shall "deliver a written inscription of his invention, of the manner of making, compounding, using and constructing the same, in such clear, full and exact terms, as to enable any person, skilled in the art or science to which it pertains, to make, construct, compound or use the same." Government grants him a monopoly of his invention for a term of years, and, in return for this protection, demands that it shall be made public property at the end of the term. That this end may be accomplished, the government requires such a description as will enable one skilled in the particular art, to make the thing invented, by simply following the said description.

I will now proceed to point out a few legal points that present themselves.

The "inventor must first swear that he believes himself to be the first and original inventor." The first point under the United States law, is that of novelty, which relates not merely to previous inventions in this country, but any where in the world. No matter how secretly it had been used in this country prior to the application for a patent, proof of such use will be sufficient to invalidate the patent. It is not enough, however, to debar the patent, to show that it had been used in

a foreign country unless it had been patented or described in some public work. The courts do not require that the desription should fully answer the purpose of specification, but only that it should serve as a direction for making or doing the thing to which the description related.

The consideration upon which a patent is granted, is novelty of every material thing, process or part, of the invention that is represented as a substantial part thereof: this consideration is an entirety, and, consequently, if any part of it fails, the whole patent is invalid. Whatever is covered by the claim of the patentee as his invention, must be taken as a part of the claim; if it turns out that any thing claimed is not new, however small or unimportant such asserted invention may be, the patent is void, and prosecution for infringement can be sustained. To show the extent to which this is carried by the courts, the case of Campion *vs.* Buryon, may be cited, in which a patent taken out for "making sail-cloth without starch," was declared void, as the true improvement consisted in a peculiar texture or twisting (described in the specification) by which he was enabled to manufacture cloth without starch, but starch had been excluded before. If a patent contains more than is necessary for the production of the described effect, and the addition was made for the purpose of evasion or deceiving the public, or if the whole specification fails to produce the described effect, the patent is void, and an infringement will not have taken place unless the patent can be successfully practiced by following the specification, an infringement being a copy made after, and agreeing with the description laid down, and if the patent does not fully describe any thing essential to the making or doing of the thing patented, there will be no infringement by the first invention of processes, which the patentee has withheld from the public. (See Webster, Pat. Cas., 167.) Nor will it be a violation of the inventor's rights, to make a machine, or composition, for the purpose of ascertaining its sufficiency to produce the desired effect, or to ascertain the truth and verity of the specification.

THOMAS BRUFF, Senr., of Maryland, June 27, 1797. This is the first patent granted in the United States for an improvement in dentistry, and somewhat curious as a relic of a dentist whose name has never appeared in any of our numerous dental publications. From the fact that James Gardette's name appears as one of the witnesses, it is probable that he was a dentist of some ability. The patent was granted for a "perpendicular extractor."

"This instrument has a double claw, with a joint near the middle, and a spring to draw them together when set on the tooth. It has a fulcrum with two branches, one to answer as a handle for the left hand, to keep it on the adjacent tooth; the other, having a hook in the upper part of the end, serves as a guide and support to the lever which passes through it, and through the staple at the extreme end, and the point through the eye of the claw; under the fulcrum is a crooked cap (sliding on with a screw head, and turning on a pin) made to shift to suit the side and shape of the jaw.

"There is another cap made long, designed to rest on the front and back teeth equally, having a hole through the middle large enough to draw the claw through. The burr has a handle nearly like the common key instrument. It has a crooked blade near the extremity, to raise it perpendicular from the fulcrum; when turned by the handle, it passes through the hook of the fulcrum to the shoulder, which is about two inches from the handle, the point being small and round, passes through the eye of the claw, (which is sharp at the top,) and by a turn on the back of the blade, brings out the teeth in a perpendicular direction." Signed, THOMAS BRUFF, Senr.

Witnesses: JAS. GARDETTE and RD. CENAF.

E. BRYAN, July 13, 1829. Vertical extractor, in which the claim is for making the claw to move on swivels. Mr. B. is better known as the biographer of Mr. Greenwood.

J. W. RUTHERFORD, Albany, New York, January 4, 1831. Vertical tooth extractor: no peculiarity either better or worse.

MOSES R. HANSON, Bangor, Maine, March 12, 1836. This is a forcep well fitted to the class of teeth to be extracted, with an attachment to rest on other teeth as a fulcrum.

DANIEL H. DICKEY, Boston, August 10, 1838. Extractor. This is so extremely *ridiculous* as to deserve notice. It consists of two claws so jointed that a wedge forced down between the ends opposite the tooth by means of a screw, will cause them to take a firm hold. To apply it, a plate with a hinged joint and hole, just large enough to admit the claws up to the joint, is laid along the adjoining teeth, the claws slipped through the hole on to the teeth; the wedge driven down by means of a screw, the end of the jointed plate depressed, while the tooth is raised *vertically*.

CORNELIUS ADDLE, Winthrop, Maine, July 13, 1833. A key, in which the only difference is, that the stem had a bend in it, by which means it was easier of application.

JOHN MCCONNELL, Philadelphia, September 29, 1839. A complicated key, in which one hook answers for all sizes and classes of teeth.

MOSES J. HILL, Bloomfield, Indiana, June 7, 1841. A key in which a friction roller constitutes the bearing part of the bolster.

J. W. BAKER & W. W. RILEY, Columbus, Ohio, Nov. 8, 1845. A combination of the key, with forcep handles, but the action is the same as the key. For those who prefer the key to the forceps it may be of some advantage if they should have a patient prejudiced against the use of the key.

ENOCH OSGOOD, Bangor, Maine, Jan. 9, 1849. "My invention is a compound fulcrum, partly concave and partly convex, of which the former rests on the surrounding teeth, and the latter on the tooth to be extracted."

HIRAM TODD, Columbus, Ohio. Cylinder key.

The claw is fixed to a rod which passes through the hollow stem, connecting with a rack and pinion, worked by hooks on either side. It is easier of adjustment, and the same extracting power.

CHARLES H. DUBBS, Natchez, October 17, 1848. Screw forcep. A combination of the notches on the shaft of the screw, with the catch of the click; by means of which the screw affords additional power in extracting roots of teeth.

The simple combination of screw and forceps, is due to Dr. S. P. Hullihen, of Wheeling, Va. (See Am. Journal of Dental Science, June, 1844, vol. —.) C. H. Dubs added the catch for holding the screw firmly, and patented it as above. John D. Chevalier produced the same effect, by a slightly different mode, which Dubs insists is an infringement. A violent controversy in the dental journals, as to priority of invention, ended as it begun.

Chevalier still advertises his "improved Hullihen screw forceps," so it is probable, that Mr. Dubs has not thought the ground sufficient to sustain an action.

"His mode of disposing of his improvement, is to sell the right of making, and individually using it, to any dentist, as a *life interest*, for three dollars." In three years his monopoly will be at an end, a rather short *life* interest.

Kirby Spencer, Athens, Georgia, October 17, 1848. Dentist's drill.

It is a tapered tube, in which are concealed the steel works which combine the endless chain, pulley, pinion and piston. The movement is like that of a syringe. It is a very handsome instrument, and very useful, but so complicated as to render it too expensive.

L. D. Walter, Fort Plain, New York, May 15, 1847.—Dentist's drill.

"A combination of the main-spring, pulley and cord."

Lemuel Meritt and S. Rogers, New York, December 27, 1815.—Relieving tooth-ache by steam.

James Utley, ———, November 5, 1817.—Tooth-ache remedy.

Horace H. Hayden, Baltimore, Md. February 11, 1824.—Preventing caries of the human teeth.—*Claim.*

"The exclusive privilege of using and vending the empyrheumatic oil (tar or balsam) and acid, obtained by the distillation of wood, which oil or acid, when properly modified, proportioned and applied, is used for the purpose of counteracting decay in the human teeth, and the diseases consequent thereto, and to the human mouth.

"By a daily use of it for two years, I have proved it to be a sovereign remedy for the diseases mentioned. Its specific qualities are owing to the antiseptic property, which counteracts the caries in the teeth, allays the pain and irritability of the vessels of the teeth and mouth, lessens the morbid sensibilities, and arouses and restores a healthy action. For deep caries and great sensibility of the parts, I apply the pyroligneous oil, with a very small proportion of the acid, aromatised with oil of cinnamon, cloves or other essential oil, to the cavity of the diseased tooth, on a deposit of cotton. This is repeated several times, as occasion may require. To correct a general disposition in the teeth to decay, for scorbutic, ulcerated or other diseased state of the gums, I use a solution of acid and oil in three parts of water, as a gargle three times a day."

This patent has been entirely overlooked by Dr. Hayden's biographers, and show what errors great and good men may fall into, but Dr. H. nobly and well atoned for an error which, at that day, was comparatively venial, by the course he assumed during the last years of his life.

SAMUEL PENNINGTON, Mt. Pleasant, Ohio, July 30, 1829. Specific for tooth-ache. Composed of "whiskey, French brandy, spirits of turpentine, tar and Indian turnip."

L. S. PARMLY, New York, June 17, 1820.—"Composition for preserving the teeth."

This is now known as "Parmly's tooth polisher." The record at the patent office being destroyed by fire in 1836, I am unable to give the ingredients.

CHARLES NEWTON, New York, September 25, 1825.—"Apparatus to keep free from saliva." Record lost.

WM. R. EAGLESTON, Baltimore, October 4, 1817.—"Setting natural and artificial teeth." Record lost.

CHARLES GRAHAM, New York, March 9, 1822.—Artificial teeth. Record lost.

ELIJAH A. BIGELOW, Brandon, Vt., March 8, 1827.—Engrafting teeth. Record lost.

ANTHONY PLANTON, Philadelphia, April 5, 1828.—Mineral teeth without platina.

"The inventor says, that necessity, which is indeed the mother of invention, suggests this improvement: platina being so scarce that it could not be procured readily. A small hole is made through the tooth at the time of moulding, which, after baking, is filled up with a wire, and solder is melted on both ends of it: or a hole is made in the tooth, but not passing entirely through; into which, the wire is introduced and solder fused around it. Teeth made in this manner, will never break or separate from their connections, and time will show that this improvement brings artificial teeth to their perfection." Most of the English teeth of the present day are made in a similar manner, except that the hole is bushed with platina.

THOMAS R. VANDERSLICE, Philadelphia, January 5, 1831.—Artificial teeth.

"Instead of applying a metallic plate on the back part of the tooth in the usual manner, the tooth is moulded with a groove in the back part, into which the plate will fit, and secured to platina wires set in the usual manner. To form the tooth in the ordinary mould, a small piece of ivory or other hard substance, with holes drilled to receive the wires, may be introduced."

Were we disposed to be fastidiously nice about the novelty of this, the old French teeth might be adduced, in which a groove was left for the reception of a wire, which was soldered to the platina cramps, and could be cut down flush with the porcelain, as in the above.

SAMUEL G. CHAMBERLIN, Philadelphia, February 11, 1831.—Artificial teeth.

"Pieces of wire are inserted in the body of the tooth, previous to its being baked, projecting from the top, and to them the gold plate is to be soldered, by which the tooth is to be attached. I claim the glazing of the inside of the tooth, and polishing of the gold plate, so that the tooth may not absorb moisture, and no unpleasant roughness present to the tongue; the manner of fixing the tooth by means of platina and gold plate. This would differ from all others in this, that there is no interstice between the tooth and plate for food or moisture to collect."

It was probably necessary to solder the plate, (strap or stay,) after fitting to the plate, and before soldering to the main plate.

Daniel Harrington, Philadelphia, December 10, 1840.

This improvement consisted in using screw or pin heads, on the platina wires, or a staple, instead of the chisel or flattened form, inserted.

Henry Lawrence, Philadelphia, May, 1849.—Artificial pivot teeth.

"I make a headed screw of gold or other suitable metal, of a size sufficient to hold the pivot tooth firmly. My tooth is of the same size and shape as the ordinary pivot tooth, but with a hole entirely through, terminating in a countersink, to receive the head of the screw. The tooth being fitted, and the canal of the root prepared to receive the screw firmly up against the root." The claim is for "a tooth with an aperture clear through it, terminating in a proper bearing for a screw-head."

Geo. E. Murray, Philadelphia, December 4, 1849.—Artificial teeth.

After stating that the ordinary plate teeth are objectionable, for the following reasons, viz. if ever so well fitted, there will be a space between the strap and the tooth, the fastening is at a point above the edge of the tooth, allowing a leverage power. The rivets are frequently ground out, and in meeting, being in great danger of breaking. He describes his as follows: "A piece of metal of proper size, is taken, and the edges bent up: this plate is placed in a mould with the flanches inward, and the porcelain paste filled in as usual, and the plate will, by means of the flanches, become securely fastened to the tooth. Various variations of the plate may be made, for example, a flanche may project from the center; or the inner edge of the flanches be made thicker than at any other point: they may be bent at right or oblique angles," etc. The claim is for "an artificial tooth, having a plate combined therewith."

For very many cases, it is the best article made, and is peculiarly adapted to molar teeth. The same tooth is described by M. Desirabode, in his "Science and Art of the Dentist," translated by C. A. Harris, M. D., for the Am. Lib. of Dental

Science," in 1847, I find the following, page 411. After describing various modes of inserting cramps, he says, "to obviate these inconveniences, we have fixed in the tooth before burning, not simply cramps, but a piece of metal forming at once the cramps and the shaft by which the tooth is to be fixed to the plate.

"This fixture is composed of a central shaft, from each side of which go off in the form of wings, little cramps, which pass into the paste and disappear."

This publication invalidates the patent.

W. WILSHIN RILEY, Columbus, Ohio, Nov. 18, 1851.—Artificial teeth.

"I claim the concave base, and the insertion of the platina in an oblique direction, and mode of attaching them to the plates without stays." The platinas entered the tooth at the lower internal edge in an oblique direction, so that when fitted, they rested against the plate, and were soldered to it. The tooth was rather thicker than usual, especially the six front ones, so that the base reached *over* the alveolar ridge, forming the concavity spoken of, and brought a greater surface of porcelain in contact with the plate, than in any other tooth. From some cause, the manner of inserting the wires has been abandoned, and now are inserted little *flat* pieces of platina, in about the same place as are the platina pins in our ordinary tooth.

Between these slips, after the tooth is fitted to its place, is passed flat pieces of gold, which is soldered to them and the plate. A continuous lining strap may be made very easily and neatly with these teeth.

JAMES CAMERON, Philadelphia, July 30, 1840.—Articulating instrument.

A perpendicular rod, "fixed in a base, with two sliding shafts similar to the lamp stand of chemical laboratories. A rod bearing a plate designed to support the upper jaw plate, passes through a hole in the vertical rod, and is held at any point by a thumb screw; below, is another plate, shaped something like the under jaw, (designed to support the lower jaw plate and draft,) which is moved up and down on the rod at pleasure. It is

attached to the tube which slides on the rod, by a hinge, which opens up and down, and is regulated by means of a nut and screw.

The plates with the drafts, are fastened to the frame by screws, and the different parts of the instrument adjusted. The upper jaw is fixed like the human jaw, except, that it may be moved backward and forward: the lower jaw moves upon the hinge like the human jaw, and also up and down on the vertical rod. This is the best articulator known to me, although somewhat complicated, so much so, indeed, that it is difficult to understand a description without drawings.

The instrument as patented, excepting the foot in which the rod is fixed, was *invented by Daniel Neall, Sr.*, of Philadelphia, several years before Cameron secured his patent, and the same instrument was on sale in that city in 1838.

Neall was one of the pioneers of block work in this country, and a man of great ingenuity. He invented the "Vertical Printing Press," the best of its day, for which he received a gold medal from the Franklin Institute.

To him, also, is due the credit of perfecting drafts or models for the construction of artificial teeth, and a description of which will appear in a more appropriate place than this article, the same never having been noticed by previous writers.

DANIEL T. EVANS, Philadelphia, August 28, 1840.—An improved mouth mould, which being filled with wax, is taken of both jaws at once, by closing them on the wax. This impression is to be placed in a hinged articulator, and filled with plaster. The mould is made without a dividing plate, so as to allow the jaws to lap in taking the impression.

JOHN ALLEN, Cincinnati, Ohio, Dec. 16, 1845.—Restoring the contour of the face.

"I claim the manner of restoring hollow cheeks, by means of metallic bulbs, constructed in the manner set forth, or by any other substance between the jaw-bone and the cheek."

The restoration of parts about the mouth, lost by accident, has long since been accomplished; and alveolar absorption is replaced by block work. But this is not the object of the pre-

sent invention, which is to fill out the sunken cheeks which are so frequent an attendant on advancing age. But, to be brief, I will insert a few extracts from a letter recently placed in my hands, addressed to a dentist, which gives the original idea, and the gist of the whole matter, dated

Dear Sir, JUNE, 1848.

I take the liberty of addressing you on a subject, the accomplishment of which seems to me desirable.

It is relative to the insertion of a set of teeth. Most of my lower teeth, and the very hindermost of my upper teeth are lost, and thereby gives way for the cheek to follow them, so that my cheeks are sunk in, rendering my face, if not deformed, at least meagre and visage like. * * * The upper front teeth cast out a little, and the upper double teeth, and one or two nearest them on each side, cast inward, so that when the mouth is naturally closed, the upper teeth fall inside of the lower teeth and gums. * * * *

I have to remark, that between the socket bone of the eye, and the prominent part of the upper gum, there is a hollow, in which the finger of a man might lie and fill it on a level only with that part of the gum which is swelled out with the body of the tooth. Sir, I am anxious to know, could this hollow part be filled up, so as to push out the skin.

I would suggest that the lower teeth which are to be inserted, be so prepared that they be outside of the upper teeth, and long enough to shoot over the upper gum, and come as far as the hollow part before described, passing just over it, effecting the thing desired. * * * * *

Sir, I would suggest that your trade is one of improving the creation, and did you ever remark that the only thing that mingles old age, though sometimes even the young countenance, is wrinkles under the eye, and a loosening of the skin. Now, if you put your finger on the temple of your eye, and push the skin towards the top of the ear, the countenance changes for the better ; youth flushing in the countenance, and the wrinkles completely gone. Perhaps an operation to effect

this, would not be painful, and if the skin when straightened, could be made fast, the thing were done.

Let me hear much from you, and tell me, could you effect what I desire. Seal your letter well.

Yours, respectfully, J—— G——.

Some time after, the writer of the above, called on Messrs. Cook & Hunter, dentists, for an operation substantially as described. They would do nothing but put in a set of lower teeth, articulating with the upper, but this would not satisfy him. They filled the *hollow* with cotton, pushing out the cheek, and that was just what he wanted, but these dentists were pleased to call it ridiculous and absurd, and refused to make a permanent fixture to produce the same effect.

Mr. G. then called on Dr. A., who soon devised the elegant fixture, for which his patent was granted, and which accomplished one of the ultimata proposed by Mr. G. The other is more difficult, but equally necessary, for when the plump cheeks of youthful beauty once lost, are again restored, their contrast with a wrinkled brow and shrivelled lips and sallow skin, makes ruin more appalling, especially if it is attended by a hollow, sepulchral voice, as are most of these attempts at restoration "of pristine beauty."

"Beauty is a doubtful good, a glass, a flower,
Lost, faded, broken, dead within an hour;
And beauty blemished once, forever's lost,
In spite of physic, painting, pain and cost."

At the meeting of the American Society, held in August, 1845, Dr. Allen presented his invention, and received the approval of that body, a gold medal, and five volumes of the "American Journal of Dental Science." Four months after that time, his patent was issued.

At the meeting of the society in 1847, a vote of censure was passed on Dr. John Allen, for having procured a patent *after* having freely offered the benefits of the invention to any member of the society, and afterwards demanding a per centage for using it.

The editor of the Dental Recorder, vol. 2, page 120, says, Dr. Allen freely granted "us the privilege of using it in our practice; but this was after we had assured him that we had seen the same principle adopted for the same purpose, some years before his patent was granted, and that we should not hesitate to make use of it whenever we saw fit."

J. SMITH DODGE, New York, March 13, 1844.

"I claim the mode of inserting artificial teeth by inclosing a metallic tube within the wooden plug or cylinder, usually employed in fixing artificial teeth."

"I make the tube of gold or other suitable metal, of such length and size as may be required: with a cap or stopping at one end, to prevent moisture from entering the cavity, causing internal decay; or without the cap leaving a free opening through its entire length."

F. HAMILTON CLARK, New York, Feb. 13, 1849.—Securing pivot teeth.

"I make an opening in the root, in the usual manner, being careful to make it perfectly smooth, round, and of an equal size, from top to bottom. Into this opening, I insert a cylinder of gold, or other metal, made to fit it with great accuracy, but not so closely as to require much force to introduce it.

"This cylinder has a bottom of a spherical form, with a hole in its center, for the purpose of allowing a screw to pass through it into the center of the root, which is pierced and tapped to receive it. A flange encircles the outer end of the cylinder, for the purpose of retaining a filling inserted in the end of the root, when decayed. It has also a bar soldered across its inner side, about midway of its length, to hold the metallic pivot to which the tooth is attached, and occupies about one-fifth of the diameter of the tube. The screw which passes through the bottom of the tube and holds it permanently in its place, has a head fitted to the bottom, which being rounded, allows the screw to follow the opening made to receive it, although it be not parallel with the bed of the cylinder; hence it is perforated lengthwise, to allow the pus to escape.

"The pivot is made of a wire drawn to the exact size of the interior of the cylinder. The end to be introduced, is to be split with a fine saw, nearly to the tooth, one side is filed flat to allow it to pass the *bar* against which it rests. A tooth set in this manner is easily removed, for the purpose of cleansing, and may be made very firm by inserting a very thin slip of wood in the cleft of the pivot.

"I claim the mode and manner of securing the cylinder in its place, as set forth."

This is a very neat mode of inserting pivot teeth, but it requires such delicate manipulation, as to greatly retard its general introduction.

The mode recommended by Professor Harris, in his Dental Dictionary, of cutting the screw on the outside of the cylinder, is much easier, and quite as good.

Desirabode describes, page 469, a mode of inserting pivot teeth with a screw; a mixture of Harris' and Lawrence's mode.

M. LEVETT and H. DAVIS, New York, Sept. 18, 1847.

"An invention for concealing the metal work used in the insertion of artificial teeth. It was done by means of a varnish composed of equal parts of shellac and linseed oil, with a little spirits turpentine, ground up with bismuth, vermilion and cobalt, in sufficient quantities to give the desired color. This is softened with spirits of turpentine, and applied over the surface of the plate and clasps with a brush." This was quite tough, and a plate to which it was applied, could be bent back and forth without detriment, but it could not withstand the action of fluids of the mouth.

Some kind of enamel was then prepared by Levett, and "rights" were advertised for sale. I am not certain that he sold *patent* rights to use it, or claimed it as a part of his patent, but presume that he was too well acquainted with the machinery of the law, not to evade this point. The exclusive right to this city, was purchased by Dr. John Allen, and used by him two years ago, being made a *feature* in his practice; but he found that the gum had not strength enough in the form he got it, to withstand the force which was applied to it in the mouth. In

using it the teeth were mounted on gold in the usual manner, and the gum applied beneath and around them, and fused.

For a more extended notice, see C. T. Cushman's article, American Journal Dental Science.

JOHN ALLEN, Cincinnati, December 23, 1851.

"I claim, as my invention, a new mode of setting mineral teeth on metallic plates, by means of a fusible silicious cement, which forms an artificial gum, and which also unites teeth to each other, and to the plates on which they are set. I also claim to be the inventor of the said cement or compound, a full and exact description of which is herein given. I also claim the combination of asbestos with plaster of Paris, for covering the teeth and plates for the purpose of sustaining them in their proper position, while the cement is being fused."

"The cement may be formed of any of the known fluxes, combined with silex, wedgewood and asbestos, intermixed with gold and platinum scraps, which form a metallic union with the plate. The compound which I prefer, is composed of *silex*, 2 oz., *white or flint glass* 2 oz., *borax* 1 oz., *wedgewood* 1½ oz., *asbestos* 2 drachms, *felspar* 2 drachms, *kaolin clay* 1 drachm. This should be intermixed or underlaid with gold and platinum scraps. The *gum color* consists of felspar ½ oz., white glass 1 oz., oxide of gold 1½ grains; mix, moisten and apply with a brush.

"The plates are constructed and the teeth arranged thereon in the usual way; I then apply the cement in a plastic state upon the outside, between and around the base of the teeth, so as to form an artificial gum; the teeth and gum are then covered with a mixture of asbestos and plaster, and the wax removed from the inside of the teeth, and the cement is applied thereupon, and also on the plate, so as to fill up all the interstices. When dry, the piece is put into a furnace, and heated sufficiently to fuse the cement, when it is withdrawn and cooled slowly. The plaster mixture is then removed, a gum color applied, and the work again placed in the furnace, and fused, as before, by which means the metallic back plates, solder and blow pipe are dispensed with, although back plates may be attached to the teeth if desired."

The first public announcement of this discovery was made in the "Dental Register," which appeared about the first of May, 1851, about two weeks after the filing of his caveat.

The first and most important claim—that of attaching teeth to plates by other than metallic connections, is taken bodily from a French work entitled "Traite de la Partie Mechanique de l'Art Chirurgie Dentiste, par C. F. Delabarre." Paris, 1820, page 228. A very correct translation of which appeared in Fitch's Dental Surgery, second edition, 1835, page 271. Unfortunately for the position assumed in the "Register," he has found that this mode of fastening is not sufficiently strong for the mouth, and now the teeth are soldered to the plates, (which must be platina, as the 22 *carat gold* will warp when subjected to the requisite heat) and the gum filled in and brought up. From three to six heats are necessary in large cases.

Delabarre describes (page 240) a mode of setting teeth by soldering them to the plate, by platina wires, adjusting them in the mouth and filling in the base which shapes the gum, which is colored in a subsequent heat. It is also briefly described in Desirabode's "Science and Art of the Dentist." (Am. Lib. Dental Science, edition) translated by Prof. Harris, page 456, and in Harris' Dental Dictionary.

If Dr. Allen had not seen any of these works, it argues badly for his acquaintance with dental literature, and his knowledge of what has already been done in mechanical dentistry.

There is now in the museum of the Baltimore College, a double set of teeth, mounted in this manner, made nineteen or twenty years ago. A set of teeth soldered to platina plates, with the backs covered with a gum colored enamel, the arch in each jaw continuous, and a set mounted on silver in the usual manner, viz. the full jaw *completed* in one piece, is placed on the plate, and soldered by means of the usual backs, were sent to the World's Fair, by Wm. M. Hunter, of this city, 13 months ago. One or both of these sets was described to Dr. Allen, months before Allen had produced a single specimen of his patent on present style. So much for the *novelty*.

The second claim is defective also. If the ingredients are simply mixed and applied, the water of crystallization in the borax will be driven off so rapidly as to destroy the symmetry of the work. The mode of preparing enamels are so various, that it would be difficult to say in what precise manner this one should be made. As he says, just below, in reference to his gum, *mix, moisten and apply*, the natural inference is, that this is to be done in the same manner.

The patent is wholly invalid, and there is not the slightest possibility of the inventor sustaining a suit for infringement.

The Mississippi Valley Association, with the exception of one individual, swallowed *the improvement*, patent, secret and all, recommending it to the profession without knowing a single ingredient of the compound, or any thing whatever of the necessary manipulation!

> "All, with one consent, praise new-born gauds,
> Though they are made and moulded of things past."

Dr. A. submitted specimens to the American Society, at its last meeting, for its consideration, and said that he was "opposed to taking out patents for professional improvements, and although a caveat had been filed in the patent office for this improvement, it might be there for ever. This promise has been literally adhered to, and the caveat is *still* in the archives of the office.

Notwithstanding this liberal promise, the society could do nothing for him except giving thanks for the exhibition of specimens.

This patent is demonstrated in the "Ohio College of Dental Surgery," the students of which are *peculiarly* favored; and it is held out as a card of inducement to students.

ASA HILL and EMANUEL G. BLACKMAN, Norwalk, Conn., February 13, 1849.

"We claim the combination of gutta percha, as a base, with such other earthy mineral and metallic substances, as will shorten it, and render it less tenacious, harden it, and render it fit for a useful filling, and give it the *desired color*, without any

noxious quality, or destroying its plasticity when heated, and the application of such compound substance to the filling of carious, hollow and defective teeth.

"This article is made by taking the gutta percha of commerce, and freeing it from its impurities and coloring matter, by boiling and working it, or by maceration, and combining with it when sufficiently heated with a dry heat to render it plastic, about two parts quick lime and one part each of quartz and felspar, all reduced to an impalpable powder, and may be varied in color by the addition of other earthy mineral or metallic substances, and slightly in hardness, by adding the filings of any of the metals used in filling teeth.

"It is entirely innoxious, becomes plastic at a moderate heat, hardens again when applied, and when reduced to the heat of the body, adhering firmly to the cavity, and is sufficiently hard and permanent for mastication."

When the American Society of Dental Surgeons fulminated its anathema against the use of amalgam, some *substitute*, easier of application than gold, and yet not liable to the charges brought against amalgam, become a great desideratum.

Soon after, the discovery of such an article was announced, and it appeared in the market, as "Hill's Soft Stopping," put up very neatly in small bottles labeled with "directions for use," *a la* Brandreth's pills, and sold at the moderate price of $15 per bottle. Although the inventor flourished his professional credentials (being a graduate of the Baltimore College and a member of the American Society) over his bantling, quackery was so apparent in his heraldry, that but little attention was paid to it at first by the profession. In the June number of the New York Dental Recorder, may be found a circular setting forth the claims of the inventor, and in August number, he still further sounds the praise of the invention, and takes the field in defence of patents for professional improvements.

Now A. Hill, D. D. S., etc. claims an equality of professional standing with those men who have freely given to the profession improvements infinitely more valuable than his, and

at the same time assumes the position, and gets the profits, which are about 6000 per cent. of the nostrum vender! two positions wholly incompatible.

He has chosen, perhaps wisely, to place his invention under the protection of the *patent law;* by so doing he takes ground with the thousand and one nostrum makers, is exposed to captious ingenuity, and the same legal, lean, wire-drawn, hair-splitting distinctions will be applied to him, as to them.

I shall endeavor to show, that by his attempt to reconcile professional dignity with an absorbing love of gain, he has forfeited all claim upon the profession; that his conception of the character of a scientific professional gentleman, is far more defective than is his knowledge of the practical application of the law of patents, which has failed to throw any safeguard whatever around him.

His assertion that the principle of rewards of scientific improvement as shown in the medals of scientific societies, the diplomas of colleges, and copy-rights to authors, is neither identical, or even in the remotest degree similar to that of the patent system, is too absurd to admit of argument.

He says, that it (the stopping) is difficult to prepare, and with a recipe and full instructions, it would be almost impossible to prepare the article, and assigns this as a reason why he *should take out a patent.* At the meeting of the American Society in 1848, he presented the claims of his compound, but declined giving the ingredients; but a very short time afterwards, (if he had not already,) sent to the patent office the above claim and specification, a copy of which may be had from that office by any one wishing it for sixty-six cents; and he says, under oath too, that that is the best recipe and mode of preparation known to him.

The color of gold has always been an objection to its use, especially in front teeth, and a substance of the same color as the tooth, which would protect it from decay, resisting perfectly the chemical action to which it is exposed, is, and always has been, a desideratum.

The inventor says that this is such an article. He also

claims in his patent, it is sufficiently hard and permanent for mastication, a point which he abandons. (See Recorder, vol 5, page 259.)

The color of the specimens sent to this city by his agents, Jones, White & Co., are so dark as to be more offensive to the eye than highly polished gold fillings.

The failure to accomplish these two points is sufficient in itself to invalidate the patent.

Any one who chooses, can make an article identical with that sent to this market, sell it when and where he pleases, and still the patentee could not sustain an action for infringement.

I consider it the best material in use for filling teeth too much decayed to be filled with gold, and as a *temporary* filling for sensitive teeth. It is also absolutely necessary to those dentists who are unable to put a solid gold filling into a difficult cavity; for a filling of it, well put in, is far preferable to a bad gold plug, which is worse than none. Its use is suggested in case where the nerve is nearly exposed, as it is more easily applied than asbestos. In the Recorder, vol. 6, page 18, the inventor describes an application of it to the insertion of artificial teeth dispensing with the use of plates entirely.

Matt. S. Foster, Trenton, N. J., Nov. 12, 1842.

"The nature of my invention consists in soldering a strip of metal of the thickness of a half-worn sixpence, and one-eighth of an inch in width, (more or less,) to the outer edges of the superior and inferior plates, designed to have incorruptible teeth fastened upon them; which teeth, are usually made in three sections, but varying to fourteen. The flange is intended to give greater strength to the arch, and prevent the introduction of secretions between the joints."

This was the first *publication* of what is now known as running or banding, although it was frequently used by block-workmen in order to conceal imperfections of filling, &c.

George Stewart, Phil. July 3d, 1847.

"Dental lever joint spring. I claim the manner of forming the spring joint and arms, by coiling the middle of the wire so as to constitute the spring joint, and extending the outer ends

thereof so as in part to constitute the elastic arms of the lever, in combination with a check plate."

An elastic wire is wound in the middle around a mandrel, about one-fourth of an inch in diameter, about three times. When the extremities of the wire are made to approach each other, the convolutions are diminished in diameter, and have a tendency to throw the arms apart. Through the spiral is placed a wire terminating on either end in a flat head of the same diameter as the spiral. Small spiral springs are passed over the arms and soldered at the outer extremities, so as to constitute one piece. The check plate alluded to, is intended to prevent the spring from being unduly bent, and is connected with the lower jaw.

This is a very pretty looking spring, and in some cases preferable to the usual form of spiral, but the general plan was described and figured by *Delabarre,* in the edition of his work published in 1820, page 444. Figures 184, 189.

The first publication of any thing relative to *chambered plates,* was the patent.

ALFRED RIGGS, New York, July 3, 1840.

He struck a plate to fit the mouth accurately, and perforated a portion of the surface resting on the palatine vault, with small holes. Over this, a plate was struck, forming a chamber about one line in depth at the oenter, vanishing to the alveolar ridge, and soldered firmly to it. The chamber thus formed, was at times divided into sections. In practice, it was found that the gum was drawn down into these holes, causing such painful inflammation, that the plate could not be retained in the mouth. In addition to this, it could not be kept clean, and soon became intolerably offensive.

He also had a valve arrangement connected with his plates, but this does not appear in his patent.

JONATHAN DODGE, M. D., New York, March 4, 1843.

This, the inventor styled "the application of the attraction of cohesion, and of capillary attraction in one and the same base, for inserting teeth." A plate was struck up in the usual manner, to fit the gum accurately : this was held to its place by

"cohesive attraction;" being perforated with numerous small holes, brought "capillary attraction" to its aid. A plate was fitted over this, and soldered to it, and to which the teeth were attached, "leaving no space, air-chamber or cavity, in which might be lodged food, mucous, or other matter."

It answered a very good purpose, but never was extended much beyond the inventor's own practice. I dont recollect of seeing any mention of it in any journal.

LEVI GILBERT, New Haven, Conn. February, 1848.

Claim.—"My invention is the application of atmospheric pressure to plates used in dentistry: the plate being single, and a chamber being sunk in the central part of the upper surface of the plate, in which a vacuum can be formed by the tongue."

When Mr. Gilbert's patent was announced, it was met, north, east, west and south, by the assertion that the same object had been accomplished long before, and in the same manner, and Mr. G. soon abandoned all hope of pecuniary emolument, and we believe, has given his invention to the public.

JOHN A. CLEAVELAND, Charleston, S. C., June 20, 1850.

In this, a plate is struck up to the gum, and in the central part of the plate an opening is made of about the size, and in the same position as the chamber in Gilbert's. Another plate is fitted over this, meeting it on the alveolar ridge, and separated from it in the palatine vault one-eighth of an inch, more or less, and soldered to it. He claims that space *between* these two plates, as his invention, and not that part between the external plate and gum, at the point where the opening is made in the internal plate. If he can distinguish the difference in the principle between his plate and Rigg's, he can do more than I can, and why a patent should be granted two things so nearly identical, is a question which the commissioner might answer.

ARTICLE VI.

On the Treatment of Deep-seated Dental Caries. By WM. H. DWINELLE, M. D., D. D. S., Cazenovia, N. Y.

FROM time immemorial it has been the highest aim of art to imitate nature. She has ever been the great ensample which we may continually approach, yet never reach; and those productions will ever be considered most perfect which most nearly resemble her own.

The sculptor who has produced the faultless form, is inferior to him who clothes his statue with a living sentiment, and makes the "marble to breathe"—yet man, the handiwork of the Divine, is infinitely superior to them both. The painter who gives you a likeness of your friend, is inferior to him who produces one, from which you feel thoughts are beating responsive to your own, and where her "rapt soul is sitting in her eyes." This is the highest attainment of art; and yet, how immeasurably do these impressions fall short of those of human magnetism and sympathy, which gush forth from the living, breathing presence.

In our own studio-laboratories, for the field of our profession is world-wide, and should embrace all art—the student who constructs a dental fixture to the satisfaction of his inexperienced patient, is greatly inferior to the master, who, in selection and arrangement, in form, and in color, closely studies the temperament and age, complexion and *physique*, of those to whom he would give the highest advantages of our art. And yet, above all of these triumphs of skill, and they are great triumphs, nature still stands pre-eminent—above all art.

Again, the operator who restores the natural dental organs, and preserves them from destruction, has achieved vastly more than he who imitates and substitutes them; but unless he has

restored to them *all* of their functions, and preserved them in *all* of their vitality, he has fallen short of the high victory which awaited him.

The nearest assimilation to nature, is the highest point of perfection, and when we have secured the preservation of the teeth at the expense of their nerves, we cannot but concede that we are at least *one* remove, and we cannot estimate this, from that complete triumph, which would enable us to contrast a living with a dead organization. Though we have discovered much, and may still more, in regard to the character and functions of the nerves of the teeth, they may have a thousand hidden influences and uses we "wot not of." Here, then, is the highest assimilation to nature. Here, the loftiest triumph of art! She is restored and preserved in the exercise of *all* of her powers; whether they be of resistance to morbid influences from without, restorative upon herself, or reflective upon the whole system.

In view of the fact, of the great importance of reclaiming and securing teeth at the highest point of perfection, I propose to take into consideration an extreme class of teeth, which, until within a few years, have been suffered to perish, or have been indiscriminately removed. I refer to that class of teeth whose bone has been suffered to decompose until that portion immediately over and covering the nerve, has lost all, or nearly all of its component of lime, to remove which, would be to ensure the exposure of the nerve. I shall arrange this class of teeth under three distinct heads. Before, however, entering into a consideration of the three classes in their order, I will, by way of preparation, record a few aphorisms, or statements, in regard to the physiological construction, condition, and habits of the teeth.

Although the nerve of the tooth is manifestly the main channel of communication of nervous sensibility, and although no branches proceeding from the nerve itself are perceptible in the structure of the teeth, yet there is a subtle agency, which emanating from the nerve, ramifies through the tubuli of the teeth to the surface of the bone. At some future time, I pro-

pose to exemplify, in the most ample manner, the truth of the proposition, that the teeth have as legitimate a channel of nervous communication to their extremities, as any other highly endowed part of the body. It will be abundantly sufficient for my present purpose to state that I am fortified in my theory by several in our profession of the most extensive experience. Dr. Elisha Townsend, of Philadelphia, among others, who, in the April, 1851, No. of the Journal, page 260, says, "The question is often asked, why is the bone so tender and exquisitely painful as it often is, at the commencement of excavating, and yet sometimes entirely painless when the diseased portions of it are removed, why should it not be attributed to inflammation? The teeth, though not highly organized, are supplied with a nerve in each fang, an artery and a vein; these give the internal vitality to the tooth, and pass that vitality through its whole bony structure, till they meet the enamel. If, then, the branches of the nerve pass through the whole bone of the tooth, to the investing surface called the enamel, it is easy to understand how the minute ends of these veins may be exquisitely sensitive when there is caries and inflammation.

"It is the experience of every one who has practiced dental surgery, that when he has cut into the pulp cavity, and severed the connection between the bony surface immediately over it, and the nerve and blood-vessels, the pain which was felt before in all parts of the tooth, immediately ceases, no portion of the cavity then being tender to the excavator, but the membrane or nerve. Does not this seem to prove, conclusively, the nerve to send minute microscopic branches through the whole tooth, which are the medium of sensation as long as the connection between them and the bone is not ruptured."

In many respects, the condition of the bone of the tooth, is strictly analogous to that of other parts of the system. When in a healthy condition, the bone of the teeth is not usually possessed of any great degree of sensitiveness, but when diseased or inflamed by exposure and contact with irritating substances, it becomes sensitive to the extreme. The gums, when healthy, can be cut with but comparatively little pain, but when

inflamed, are exceedingly sensitive to the slightest touch. The eye can be almost rudely handled in its healthy state, without giving pain, and yet, in a few hours it may become so sensitive that a feeble ray of light will overpower it.

The condition of the teeth under some circumstances become highly exalted, so much so, that Niel and Magendie have ascribed to them the sense of taste.*

We can amputate diseased and intensely organized bone, and cast it aside in the same way we would an inflamed and sensitive fungus from healthy parts over which it reposed.

. It seems to be a principle of physiology that the extremities of the nerves shall be endowed with the highest degree of sensitiveness. The severing of the median or sciatic nerves causes scarcely more pain than the excision of a few score of their myriad branches terminating on the surface; a severe scald, covering a considerable surface causes the most agonizing pain, and often, immediate death, whereas, the severing of every one of the principal nerves which gave vitality to the parts, would be attended with comparatively slight pain.

The most sensitive part of the healthy bone of a tooth, is at the boundary line between itself and the enamel, and most distant from the nerve—in fact, at the extreme *surface* of the bone. A patient will oftentimes experience far more pain while you are excavating parts where the bone loses itself in the enamel, than when you extirpate the nerve itself.

As the condition of the bone and nerves of the teeth are in many respects analogous to other parts of the system, so are they in most respects alike subject to medical and surgical remedial agencies. Palliatives, counter-irritants, blood-letting, blistering, anodynes, caustics, &c., &c., are all of them legitimate, and often successful remedies for restoring to healthful action diseased nerves which otherwise would have perished.

But to return to the classification of the order of teeth under consideration.

CLASS 1. Teeth, the nerves of which are only covered by softened bone, but which, otherwise, so far as can be ascertained, are healthy, or are capable of being restored to health.

*Oliver's Physiology, p. 390, 3d ed.

CLASS 2. Teeth, whose nerves are by accident, in excavating or otherwise, exposed—even lacerated, but which are healthy, or are capable of restoration to health.

CLASS 3. Teeth, whose nerves are incapable of restoration, and whose destruction is inevitably required.

The first class of teeth I propose after necessary treatment, to fill without uncapping the nerve by removing the soft parts over it, with the reasonable expectation that I shall thereby permanently arrest the decay and secure to the tooth a full exercise of all its functions and powers.

The second class I propose to restore to health, if inflammation has not extended too far, then, after carefully capping the nerve, to fill the tooth in the usual manner, with a good prospect of securing its vitality, at least in a large majority of cases.

The third class I propose to treat by destroying and removing their nerves, and plugging them in the manner practiced by Maynard, Arthur, Dunning and others.

It will be readily conceded, that I have placed the most important class of teeth at the head of my list, for if they can be so treated as to entirely arrest their decay, and at the same time leave the nerve undisturbed to exercise its offices and powers without a prospect of their interruption, the operation must rank first in importance with any known in our profession.

For nearly ten years past, I have been in the practice of treating the class of teeth under consideration, in the manner referred to, and, too, with a degree of success which warrants me in speaking with considerable confidence on the subject.

In vol. 7, (1846,) page 74, of the American Journal of Dental Science, will be found an article "On the preparation of a cavity of a tooth preparatory to plugging," in which I advocated what was then considered a new and very unorthodox method of leaving decomposed bone immediately over the nerve, when its removal would expose it, and then proceed to fill it as usual. After giving a description of the extreme cases in which I felt justified in the operation, I proceeded as follows: "Under circumstances like the foregoing, after having thor-

oughly cleaned the walls, and such parts of the bottom of the cavity of the tooth, as I can safely do, without interfering with the nerve, I wash out the cavity with a solution of soda, and then proceed to fill the tooth in the usual manner, taking care, however, especially if the parts are much softened immediately over the nerve, to skilfully build an arch over that point, so as to enable it to resist the nerve pressure of filling, finishing," &c. * * * * * *

"In considering teeth treated in the manner described, the question very naturally presents itself, '*does the decay go on?*' I answer emphatically, *No!* the decay is entirely a chemical action, and depends upon *external* agencies alone, for its progress, such as air and water, and such other influences as will promote a constant acidulated and decomposing action. The *decay* possesses no quality in itself of advancement, and when the cavity within the tooth is so completely and skilfully closed, as to cut off all communication from *without*, it is as impossible for the decay to advance, as it would be if the nerve was capped with bone of the purest whiteness."

* * * * *

"The fact that the nerve is constantly receding with the age of the patient, to say the least, encourages our operation; and if our work is skilfully performed, and does not interfere with the internal membrane of the tooth, so as to cause inflammation, justifies us in the conclusion that it is permanent and complete."

"Although the new doctrine was kindly received by most of the profession, it met with ridicule from others, accompanied by silly untruths and ridiculous hypotheses. In opposition to years of actual experience, one who disclaimed all personal knowledge or experience in my method of practice, vaguely remarks that the safety of the tooth, would be jeopardized by the partially decomposed bone, or "cartilaginous portion *drying down* and occupying less space than when the tooth was filled!"

Subsequently, in a letter to the Baltimore editor of the Journal, vol. 7, page 375, in defending my position, I attempted to prove that the bones are capable of great changes in their rela-

tive constituents, at times comparatively soft, and at others hard even to brittleness, and yet, through all their changes, retain their identity as bone. "A tooth may lose a fraction of its lime, and yet retain all of its essential qualities as a bone, as is manifest in the bones of different individuals, some of which almost vie with flint in texture, while others may be literally whittled with a knife. The bones of an infant contain but comparatively a small quantity of lime, and yet they possess all the essential qualities of bone—distinct, living, organized bone. The bones of an aged person contain a much less quantity of gelatine, and yet they perform all of the requisite functions of bone."

Of the softened parts over the nerve, I said, "the decomposition, under the circumstances, will not go on, nor will it (the soft bone) *dry down*, and occupy less space than it did before, as cartilage would, situated in a *dry place*, and entirely remote from the influence of moisture. It would not dry down, I say, especially as the tooth is not dead, and as the whole surrounding bone is of a porous quality, and the parts are immediately over a moist living nerve."

In allusion to the truthfulness of my proposition, and also to my desire thereby to benefit the profession, I concluded with "*tempus discernet!*" and time *has* shown!

Notwithstanding my subsequent experience had not only confirmed, but very extensively enlarged my views in the direction I had taken on this subject, still, with the exception of an occasional word of encouragement from some of my professional brethren, nothing came under my observation to induce me to think the profession, generally, would even sympathize with me in the great importance I had attached to the operation, until, as if to compensate for all of the past, suddenly and most unexpectedly I found the able pen of one of the best writers, as well as one of the best operators in our profession, advocating and defending, past all controversy, views and principles which heretofore for years, I had advocated and defended alone.

In No. III, of a series of articles on the "Treatment of dental caries, complicated with disorders of the pulp and peridental

membrane, by Robert Arthur, D. D. S.," Journal of Dental Science, vol. 2, new series, page 1, the able author has in a far more graceful and concise manner than I could have done, expressed my views as well as practice, in treating that class of teeth whose nerves are only protected by a layer of decomposed, or partially decomposed, bone. His extensive experience, careful observation and correct judgment in this interesting field of inquiry, enables him to add much of great practical value to the profession. I think, however, as I can date the beginning of my experience in the peculiar mode of treatment under consideration, as far back as any one within my knowledge, and, as subsequent experience and observation would be likely to have a not unimportant bearing upon the subject, I shall be excused if I hastily describe my present method of treating the class of teeth under consideration, even though I may reiterate some things already expressed in the excellent article of Dr. A.

Indorsing anew, the principle laid down in my communication to the Journal in 1846, I repeat that the decay of the teeth is a chemical action, and depends upon external agencies for its progress; that this chemical operation is but the legitimate action of acid upon the tooth, uniting with its lime, which constitutes its base, gradually decomposing it, and leaving the gelatine, or animal matter, to waste by mechanical and other influences; and that this decomposing agency is generally derived from food and condiments retained in the interstices of, or between, the teeth, or attached to some external nucleus until, if it is not already an acid, it is generated by acidous fermentation. That the decay possesses no quality in itself of advancement, &c., &c. In brief, when in the course of excavating a cavity preparatory to plugging, if, in my opinion, decomposition has so fàr proceeded as to reach the membrane of the nerve, and yet has not materially affected its healthful condition, and which said softened or decomposed bone, if removed, would ensure the exposure of the membrane or nerve, I invariably proceed to fill the tooth, leaving a portion of softened or decomposed bone, immediately over the nerve. I am particular to thoroughly excavate the walls and such parts of the bottom of

the cavity of the tooth, as I can do with safety; and if any material pain continues in the tooth when I have ceased to excavate it, I dip a pledget of cotton in a concentrated solution of spirits of camphor, and apply it within the cavity, let it remain for a short time, then wash it out with a weak solution of soda, dry it with soft paper and proceed as usual. If the soft parts are much sensitive to pressure, I either over-arch them with foil, or protect them with a concave cap of gold plate, so as to leave a slight space between it and the bone, immediately over the nerve. I often let this space be filled with some non-conductor, such as asbestos, liquid cuticle or wax.

I have pursued this course for several years past, and with almost universal success; it has been very rare, indeed, that the destruction of the pulp of the tooth has supervened, and only one instance has come to my knowledge where the loss of the tooth has resulted from the operation. My practice has embraced many hundred teeth treated in this manner, and has extended over a space of eight or ten years; and although I would naturally be as ridiculous to inquire into the after history of teeth treated in this manner, as circumstances would admit of, it is not to be presumed that I could have the opportunity of seeing, at the most, more than a majority of them. Yet, from careful observation, I feel justified in saying, that I should be greatly disappointed, if in fifty cases treated in the manner described, more than one of them failed, and even in the case of failure, by careful subsequent attention and treatment, the tooth could be redeemed, though with the loss of its nerve.

Whatever of decomposing agencies that may be left in the softened parts, are either neutralized by treatment, or soon exhaust themselves.

Every avenue being cut off from all external influences, all further decomposition is arrested. Nature, aided by art, is left surrounded by the most favorable circumstances to recuperate herself. The *natural* condition and relation of all the parts, the invariable changes of time, the "common law" of physiology, all favor and promote the end.

The decomposed or softened bone over the nerve, after it is properly treated is the best possible covering for it; of itself, it is a non-conductor, and though wanting in vitality, nature does not regard it as extraneous. It adapts itself to the nerve as no artificial substance can, and finds that delicate boundary line, where the living and semi-vitalized organization, blends into and reposes unharmed upon the dead.

Repeated experiments have proven beyond doubt, that this very decomposed bone, which, by the way, is not always discolored, if protected by a proper filling, will ultimately receive any absorption, or deposit from the nerve a sufficient quantity of lime to compensate for its loss, and to render it as bony and compact as before. There are more reasons to believe that this effect may be produced artificially from without, I will refer to this on another page. Every one knows that the nerve cavities of our teeth are being constantly filled up and diminished by osseous deposit, that the nerves of the teeth are continually receding with our age, so that ultimately the nerve canal becomes entirely obliterated.

All of these circumstances combine as aids to the success of our operation; while, in addition, "Nature is ever busy, by the silent operations of her own forces, endeavoring to cure diseases," and is continually gathering new energies to resist attacks upon her citadel.

I have intimated that diseased teeth were often as capable of restoration to health as any other part of the system. Nature often recovers of herself, after the severest inflammatory attacks upon the nervous organization, and peridental membranes of the teeth, the result of accident or disease. Depletion in various ways, with treatment of the general system, naturally suggests itself as a remedy for excessive vascular action and congestion, to which the dental organs are liable. When the physical system receives violence from whatever cause, a certain degree of inflammation is essential to her recovery; it is only the *excess* of inflammatory action which produces disorganizing results. It is the province of art to graduate this internal energy of the system, so that it may be expended at that point of physical restoration for which it was aroused.

In case a tooth, whose pulp is slightly protected, has been subjected to inflammation and pain for no considerable length of time, it can often be restored to health, by first removing such parts of the decay as can be done with safety, or causing too much pain, and then treating it with a concentrated solution of camphor and tannin, together with a small quantity of soda, or tannin, soda and creosote, not very concentrated; a little experience will determine which of the two remedies operate the most kindly. In addition to this, should symptoms indicate an inflammatory condition of the system, especially a tentency to the head, gums, and teeth, give cathartics, and let the patient diet; a few days will suffice, when generally it will be safe to proceed and fill the tooth as usual.

In the treatment of the class of inflamed and sensitive teeth under consideration, it was my good fortune several years ago to discover and introduce into my dental practice a new and valuable remedy. I refer to the *tannate of lead*. This I have used in different ways, according to convenience or the character of the case. Sometimes I take the simple powder and work it into white wax, until it has taken up all it is capable of doing, and retain its tenacity; a pill of this of sufficient size to fill the cavity will often produce the most satisfactory results. At other times I have made a solution of the tannate of lead, by mixing it with reduced chloroform, and then adding a few grains of soda. At other times when I could not readily obtain the tannate of lead of the dispensatory, I have found a good substitute in the following: Make a solution of tannin and chloroform, into this put a few grains of acetate of lead, together with a few grains of soda.

By applying a few drops of these solutions upon a pledget of cotton and placing it within the cavity of a sensitive tooth, and at the same time treating the system generally, if indications seemed to require it, I have seldom failed to meet with the most gratifying results.

The relative medicinal character of lead, its influence upon inflammatory action, has long been acknowledged, yet I think it has rarely, if ever been resorted to as a remedy for the teeth.

It is true, it has been observed for years, that teeth which were too sensitive to admit of a gold filling, could be readily and painlessly filled with lead and tin. I occasionally adopt this course now, and several months afterwards remove the lead and replace it with gold. From these hints I have adopted its use in the form referred to. The character and uses of the other articles in the formula are apparent.

Some eight years ago, by way of experiment, I used arsenic to reduce the inflammation of the dental bone, and destroy its sensitiveness, but without the intention of destroying the pulp. It was my practice to let the arsenic remain not to exceed two or three hours within the tooth; after removing it, I generally found the sensibility of the tooth exceedinly exalted; filling it carefully with cotton dipped in camphor, I let it remain for several days, when I would generally find that all sensitiveness had ceased. I am sorry, however, to add, that, *ultimately*, I found that quite too many of my teeth died—though by no means a majority of them—under circumstances which gave me some unpleasant reflections in regard to the potency of arsenic. Though I abandoned the use of arsenic under circumstances like the foregoing, I had been sufficiently successful, even with this dangerous remedy, to justify me in the conviction that there was a correct, and a practical principle involved in the idea, and that it could be successfully carried out, if I could only find some milder modification of arsenic. In conversation, a few years after, with some of my professional brethren, *cobalt* was mentioned to me as an excellent article for destroying the nerves of teeth. After inquiring into its nature, I at once commenced using it in the manner I had before used arsenic; and after a few months experience with it, found it equal to my highest anticipations. I have used it, heretofore, combined with white wax, in the same manner that I have used the tannate of lead. I think Dr. Arthur's method of combining it with gutta percha would be far preferable. I do not allow the cobalt to remain in the tooth, generally, more than twelve or fifteen hours, no matter how sensitive the bone of the tooth when the cobalt is removed; a few days time will

scarcely ever fail to find the sensitiveness entirely removed. Perhaps the reason why the cobalt has been so readily effectual in my practice when combined with wax, is, that after mixing the wax thoroughly with cobalt, just before introducing it into the cavity, I dip the side of the pellet I intend shall come in contact with the bottom of the cavity again into the powdered cobalt, so that when pressed to its place, the cobalt comes in actual contact with the bone. Dr. Arthur's method of applying it with a solution of sandarach and alcohol, I should think—indeed, I *do think*, for since reading his article I have tried it repeatedly—would be a very convenient method especially for shallow cavities.

It is now about four years since I have been established in the use of cobalt in my practice, I consider it one of the most valuable of our dental remedies. It is also a safe remedy; if used with ordinary care, together with a common degree of watchfulness and attention afterwards, one scarcely need ever fail of perfect success.

As Dr. Arthur's experience is fully corroborative of my own, and as he has expressed himself at length, and most clearly, on the subject, it is not necessary for me to say more. The inflammation of the periosteum of the tooth, incident sometimes to the use of cobalt, will, of itself, almost invariably subside; if it should continue, a little remedial aid will soon restore it to its former condition.

If a tooth has been painful for any great length of time, and inflammation has so far extended as to commence disorganizing influences upon the structure of the nerve, of course there is no remedy but to remove the pulp and fill the dental canal to its extremity.

Since 1845, I have frequently removed gold stoppings from teeth which were filled upon softened bone, as described in this article, teeth that were filled from one to seven years before, and I have invariably found the former softened parts as hard and insensible as the surrounding bone.

It sometimes occurs, that a tooth filled in the manner described, after a few days have elapsed, gives indication of pre-

monitory symptoms of inflammation of the pulp, together with that of the peridental membrane. In these cases, I temper my remedies to the condition of the case, but always recommend treatment of the general system by cathartics, diet, and such other influences as will have a tendency to dissipate concentrated inflammatory action. In connection with this, a repeated application of a solution of sugar of lead to the gums, or simply scarifying the gums and about the necks of the teeth, is oftentimes sufficient.

In more decided cases of inflammation of the nerve, powerful counter-irritants applied to the gums on a line with the tooth, and particularly opposite its extremity, rarely fails to subdue it. For this purpose, I use cantharides plaster, nitrate of silver, and, latterly, chloride of zinc. In using the cantharides plaster, I take a small piece of kid or chamois leather, and cut out of its center a longitudinal strip corresponding to the surface I wish to effect with collodeon or liquid cuticle. I paste upon its back another piece of leather of the same size, this gives a longitudinal cavity which I fill with plaster; after drying the mucous surface as dry as possible, I apply this to the gums over the tooth, letting the lip fall over the leather, as adjusted, directing the patient to be careful and not disturb its position. I let it remain until a blister has formed; almost invariable and permanent relief ensues, together with the recovery of the nerve to health.

In using the nitrate of silver, after elevating or depressing the lip, as the case may be, I apply the crude stick to the gums, letting it remain upon one part until they are thoroughly cauterized before I remove it to another. This is often an effectual remedy, and has the advantage over the other of being more convenient.

Recently, I have used chloride of zinc, making a paste with equal parts of flour and zinc, I apply in the same manner I use the cantharides. My experience has not been extensive with this article in this connection, but in some instances its influence has seemed almost magical.

In cases like the foregoing, the treatment is recommended

upon the presumption that they have received proper attention, and have been taken *in time*. Of course, if all remedies fail, the removal of the pulp is indispensable to the tooth.

I shall venture before leaving this subject, to present a few cases from my "case book," tracing each case as far as my knowledge of it extends.

"May 6, 1845. Plugged with gold, first right superior molar, for Miss M——, aged 16. Cavity large and quite sensitive; over-capped with light yellow, soft, partially decomposed bone, yielding to the touch and exceedingly sensitive to pressure. Removed all I could of it with safety, treated it with camphor, built an arch over soft parts with foil, and completed the operation without pain. Directed the patient to call next day."

"July 7. Miss M—— called to-day; was unexpectedly called out of town the day after her bad tooth was filled, the reason why she did not call as directed. Says her tooth feels perfectly natural, and has given her no pain, aside from being sensitive to cold and warm drinks, but thinks this wearing away."

"Nov. 16, 1850. Miss M——, now Mrs. F——, called to-day; filled several teeth for her; says the tooth in which I sealed up decay, in 1845, is now one of the best teeth she has; feels perfectly natural. For years it has not been sensitive to cold or warm drinks. It gave every indication of full vitality, good color, no appearance of decay; the large and polished surface of the gold stopping is as perfect as when it was first completed. The joints between the gold and tooth surface, as unbroken, impervious and perfect as ever."

"Sept 19, 1846.—To-day plugged a large cavity in front approximal surface of first inferior left molar, for Mrs. G——, aged 26, nerve nearly exposed, only covered by soft discolored bone, yielding and elastic to touch, soft parts very sensitive to pressure, but not sensitive when undisturbed. Dosed it with concentrated camphor for a few hours, then proceeded and filled it as usual: operation perfectly satisfactory in all respects."

"June 25, 1849.—Mrs. G—— called at my office to-day, to have several teeth treated and filled. Consented to let me re-

move the large plugging I inserted in her lower molar tooth in 1846. She states the tooth had never given her the slightest inconvenience. On removing the gold, I found the walls and bottom of the cavity clean and dry—was gratified to find the slightly discolored bone over the nerve very hard, giving off a crepitus, and ringing as a cutting instrument passed over its surface; it was insensible to pain even when pressed severely with a blunt instrument. The soft parts have evidently received back their quantum of lime; the thickness of the plate of bone between the cavity and the nerve has manifestly greatly increased. Re-plugged the tooth without inconvenience."

"December 20, 1849.—To-day removed 21 teeth and roots for Mrs. H., aged 32. In 1844, filled second left inferior molar on grinding surface, cavity very large, excavated nearly all of the bone within the crown; parts just over the nerve, soft, yielding, discolored and very sensitive." Treated and plugged as above. "Removed this one among the rest, though it was entirely free from decay, and the plugging was as bright and firm as ever, for the reason that all the rest of the teeth are so much decayed and diseased they are past remedy. She desires a full set, and under the circumstances I feel justified in removing this with the rest. Held a *post mortem* over the victim tooth. With a watch-spring saw, I cut the tooth in twain from grinding surface, through gold stopping, nerve and roots to apex. The appearance of the exposed sectional surfaces of the different internal parts of the tooth was quite interesting. The nerve was living and healthy. The gold stopping was all that I could desire and had accomplished all that could be expected. But what was most satisfactory was the appearance of the plate of bone between the gold and nerve; here was two layers or strata of bone, that next to the gold of a yellowish cast, corresponding to parts which in 1844 were "soft, yielding, discolored and very sensitive," but now hard and strong; between this and the nerve cavity, was a layer of bone of pearly whiteness. This last, in my opinion, has been deposited or secreted during the last five years.

"February 24, 1852.—Mr. C——, aged 38, called to-day, brought a vial to me containing a tooth which he had lost by a kick from a horse. I find it to be a right superior cuspid, one which I treated in 1847, by filling over decomposed bone overlaying nerve. I recollect the tooth, after being filled, required considerable treatment in consequence of inflammation supervening. On cracking open the tooth, found the nerve was evidently living at the time of the accident, but that the pulp cavity—the *head* of the nerve—was nearly filled with moveable osseous granules, probably induced by inflammation after the tooth was filled. The gold stopping in the tooth was every way satisfactory."

I will give one more case, more particularly to exemplify a hint I have given in another part of this article. In 1844 and '5, I tried many experiments with an amalgam of mercury and silver. A friend of mine called one day to have a molar tooth, much decayed, extracted. I induced him to let me try the effect of an amalgam filling in it, for the purpose of watching its influence, &c., &c. The tooth had nothing but the shell of the crown left, and was quite sensitive; but after much patience and more time, I succeeded in removing nearly all of the decay from the walls of the tooth, and a part from the bottom of the cavity. I filled it as well as I could with amalgam, with the intention of removing it in a few weeks, even though the pain ceased, for the purpose of noting the effects of the article, which of course I did not regard with much favor. Next day I saw my patient, who informed me that the tooth had given him no inconvenience. A few weeks afterwards he went to Havana, thence to Europe. I did not see him again until his return in 1848; was surprised to learn from him that he still retained the amalgam tooth, though he said it had become loose within a few months, it had probably ulcerated, though he did not know it. I removed the tooth, found the nerve dead; but on removing the amalgam, I was surprised to find the decay had not advanced since it was filled; and still more surprised to find the soft parts which I had left in the tooth, though quite dark, were completely *fossilized*, being exceedingly hard—even

flinty, and when cut, leaving a bright, glittering surface. I could not satisfy myself that the pulp cavity had diminished since the operation.

Since then, I have made it a practice to particularly examine amalgam treated teeth, and have often been surprised to find parts that were evidently once soft, decay, and that about the *walls*, even of the tooth, had become *fossilized*, as though the soft parts had absorbed a portion of the black metallic oxide thrown off from the mercury and silver, so as to arrest decay—as though in fact, a kind of embalming process had transpired! Query—May not a useful hint be gathered from this? may not the dead bone, that intermediate layer in a carious tooth, which must ever over-lie and blend into the living bone, may not this be fossilized by external application of harmless substances? I am no advocate for amalgam, but am willing to receive a good hint from any source, and shall pursue this subject farther some time.

Class 2 and 3 will form the subject of an article in the next Journal.

SELECTED ARTICLES.

ARTICLE VII.

Teeth—Comparative Anatomy.

(Continued from page 305.)

I PROCEED now to briefly point out the leading characteristics of the teeth in the different classes of the vertebrate animals.

Dental System of Fishes.

The teeth of fishes, whether we study them in regard to their number, form, substance, structure, situation, or mode of attachment, offer a greater and more striking series of varieties than do those of any other class of animals.

As to *number*, they range from zero to countless quantities.

The lancelet, the ammocete, the sturgeon, the paddle-fish, and the whole order of *lophobranchii*, are edentulous. The myxinoids have a single pointed tooth on the roof of the mouth, (*fig*. 16, *a*,) and two serrated dental plates (*b*) on the tongue. The tench (vol. iii. p. 979, article Pisces) has a single grinding tooth on the occiput (*c*,) opposed to two dentigerous pharyngeal jaws below (*dd*.) In the lepidosiren a single maxillary dental plate (*fig*. 17, *a*,) is opposed to a single man-

Fig. 16. Fig. 17.

Myxine. (*Muller*.) *Lepidosiren*.

dibular bone (*b*,) and there are two small denticles on the nasal bone (*c*.) In the extinct sharks with crushing teeth, called *ceratodus* and *ctenodus*, the jaws were armed with four teeth, two above and two below. In the *chimæræ*, two mandibular teeth are opposed to four maxillary teeth. From this low point the number in different fishes is progressively multiplied, until, in the pike, the siluroids (*fig*. 18,) and many other fishes, the mouth becomes crowded with countless teeth.

With respect to *form*, I may first observe, that as organised beings withdraw themselves more and more, in their ascent in the scale of life, from the influence of the general polarising forces, so their parts progressively deviate from geometrical figures: it is only, therefore, in the lowest vertebrated class, that we find teeth in the form of perfect cubes, and of prisms or plates with three sides (*myletes*,) four sides (*scarus*,) five or six sides, *myliobates* (*fig*. 19.) The cone is the most common form in fishes: such teeth may be slender, sharp-pointed, and so minute, numerous, and closely aggregated, as to resemble the plush or pile of velvet; these are called "villiform teeth"

(*dentes villiformes, dents en velours*;*) all the teeth of the perch are of this kind; when the teeth are equally fine and numerous,

Fig. 18. Fig. 19.

Palatine bone and teeth (Silurus.) *Jaws and teeth (Myliobates.)*

but longer, they are called "ciliiform" (*dentes ciliiformes*:) when the teeth are similar to but rather stronger than these, they are called "setiform" (dentes setiformes, dentes en brosse) conical teeth, as close set and sharp pointed as the villiform teeth, but of larger size, and called "rasp teeth" (dentes raduliformes, dens en rape or en cardes, fig. 18;) the pike presents such teeth on the back part of the vomer; the teeth of the sheat-fish (silurus glanis) present all the gradations between the villiform and raduliform types. Setiform teeth are common in the fishes thence called chætodonts;† in the genus *citharina* they bifurcate at their free extremities; in the genus *platax* they end there in three diverging points (fig. 20,) and the cone here merge into the long and slender cylinder. Sometimes the

* The French terms are those used by Cuvier and Valenciennes in their great "Historie des Poissons," 4to.

† Χαιτη, bristle; οδους, tooth.

cone is compressed into a slender trenchant blade: and this may be pointed and recurved, as in the *muræna*; or barbed, as in *trichiurus*, and some other scomberoids; or it may be bent upon itself, like a tenterhook, as in the fishes thence called goniodonts.* In the bonito may be perceived a progressive thickening of the base of the conical teeth: and this being combined in other predatory fishes with increased size and recurved direction, they then resemble the laniary or canine teeth of carniverous quadrupeds, as we see in the large teeth of the pike, in the lophius, and in certain sharks.

The anterior diverging grappling teeth of the wolf-fish, form stronger cones; and by progressive blunting, flattening, and expansion of the apex, observable in different fishes, the cone gradually changes to the thick and short cylinder, such as is seen in the back teeth of the wolf-fish, and in similar grinding and crushing teeth in other genera, whether feeders on sea-weeds, or crustaceous and testaceous animals. The grinding surface of these short cylindrical teeth, may be convex, as in the sheep's-head fish (sargus;) or flattened, as in the pharyngeal teeth of the wrasse (labrus.) Sometimes the hemispheric teeth are so numerous, and spread over so broad a surface, as to resemble a pavement, as in the pharyngeal bones of the wrasse or rockfish (labrus, fig. 21;) or they may be so small,

Fig. 20. Fig. 21.

Mandibular teeth, magnified (Platax.) *Inferior pharyngeal bone and teeth (Labrus.)*

*Γωνία, an angle; ὀδοὺς, a tooth.

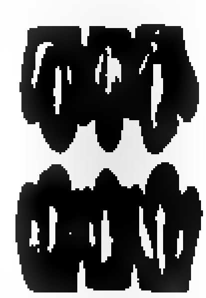
as well as numerous (dentes graniformes,) as to give a granulated surface to the part of the mouth to which they are attached (premaxillaries) of cossyphus. A progressive increase of the transverse over the vertical diameter, may be traced in the molar teeth of different fishes, and sometimes in those of the same individual, as in labrus, (fig. 21,) until the cylindrical form is exchanged for that of the depressed plate. Such dental plates (dentes lamelliformes) may be found, not only circular, but elliptical, oval, semilunar, sigmoid, oblong, or even square, hexagonal, pentagonal, or triangular; and the grinding surface may present various and beautiful kinds of sculpturing. The broadest and thinnest lamelliform teeth are those that form the complex grinding tubercle of the diodon. The front teeth of the flounder and sargus, present the form of compressed plates, at least in the crown, and are true *dentes incisivi*. Numerous wedge-shaped dental plates (dentes cuneati) are set vertically in the upper pharyngeal bones of the parrot-fish (scarus, fig. 22.) A thin lamella, slightly curved like a finger-nail, is the singular form of a tooth in an extinct genus of fishes, which I have thence called *petalodus*.

Fig. 22.

Superior pharyngeal bones and teeth (Scarus.)

Sometimes the incisive form of tooth is notched in the middle of the cutting edge, as in sargus unimaculatus. Sometimes the edge of the crown is trilobate (aplodactylus, fig. 23.) Sometimes it is made quinquelobate by a double notch on each side of the large middle lobe (boops.) In the formidable sea-pike (sphyræna barracuda) the crown of each tooth, large and small, is produced into a compressed and sharp point, and resembles a lancet. Sometimes the edges of such lancet-shaped

Fig. 23.



Front teeth of Aplodactylus.

teeth are finely serrated, as in *priodon*, and the great sharks of the genus *carcharias*, the fossil teeth of which indicate a species (carch. megalodon) sixty or seventy feet in length.

The lanceted form is exchanged for the stronger spear-shaped tooth in the sharks of the genus *lamna;* and in the allied great extinct *otodus*, as in the small porbeagle, similarly shaped, but stronger, piercing and cutting teeth were complicated by one or more accessory compressed cusps on each side their base, like the Malay crease.

With respect to situation, the teeth in sharks and rays, are limited to the bones (maxillary and mandibular,) which form the anterior aperture of the mouth : in the carp and other cyprinoids, the teeth are confined to the bones (pharyngeal and basi-occipital) which circumscribe the posterior aperture of the mouth. The wrasses (labrus) and the parrot-fishes (scarus) have teeth on the pre-maxillary and pre-mandibular, as well as on the upper and lower pharyngeals; both the anterior and posterior apertures of the mouth being thus provided with instruments for seizing, dividing, or comminuting the food, the grinders being situated at the pharynx. In most fishes teeth are developed also in the intermediate parts of the oral cavity, as on the palatines, the vomer, the hyoid bones, the branchial arches; and, though less commonly, on the pterygoids, the entopterygoids, the sphenoids, and even on the nasal bone, (fig. 17, *c*.) It is very rare to find teeth developed on the true superior maxillary bones; but the herring and salmon tribes, some of the ganoid fishes, and the great sudis, are examples of this approach to the higher vertebrata. Among the anomalous positions of teeth may be cited, besides the occipital alveolus of the carp, the marginal alveoli of the prolonged, depressed, well ossified rostrum of the saw-fish, *pristis*. In the lampreys and in helostomus (an osseous fish,) most of the teeth are attached to the lips. Lastly, it is peculiar to the class *pisces*, amongst vertebrata, to offer examples of teeth developed in the median line of the mouth, as in the palate of the myxines (fig. 16, *a*,) or crossing the symphysis of the jaw, as in *notidanus*, *sycmnus*, and *myliobates*.

Nor is the mode less varied than the place of attachment. The teeth of *lophius*, *pæcilia*, *anableps*, are always movable. In most fishes they are anchylosed to the jaws by continuous ossification from the base of the dental pulp; the histological transition being more or less gradual from the structure of the tooth to that of the bone. Sometimes we find, not the base, but one side of the tooth anchylosed to the alveolar border of the jaw; and the teeth oppose each other by their sides instead of their summits (scarus;) in *pimelodus*, however, where the teeth are thus attached, the crown is bent down in the upper teeth, and bent up in the lower ones, at right angles to the fang, so that they oppose each other by the normal surfaces. Certain teeth of recent and fossil cartilaginous fishes have their base divided into processes like fangs, but these serve for the attachment of ligaments, and are not set in bony sockets like the true fangs or roots of the teeth of the mammalia. Some sharks have two divaricating fangs: some fossil teeth referred to my genus *petalodus* by Agassiz, with the specific name "*radicans*," have the base divided into several fangs or processes, indicating a generic distinction. The base of anchylosed teeth is, at first, attached to the jaw-bone, by ligament; and in the cod-fish, wolf-fish, and some other species, as calcification of the tooth progresses towards its base, the subjacent portion of the jaw-bone receives a stimulus, and develops a process corresponding in size and form with the base of the tooth: for some time a thin layer of ligamentous substance intervenes, but anchylosis usually takes place to a greater or less extent before the tooth is shed. Most of the teeth of the lophius retain the primitive ligamentous connection; the ligaments of the large internal or posterior teeth of the upper and lower jaws, radiate on the corresponding sides of the bone, the base of the tooth resting on a conformable alveolar process. The ligaments do not permit the tooth to be bent outwards beyond the vertical position, but yield to pressure in the contrary direction, by which the point of the tooth may be directed towards the back of the mouth; the instant, however, that the pressure is remitted, the tooth returns through

the elasticity of the bent ligaments, as by the action of a spring, into its usual erect positions (vol. iii, p. 978, article Pisces;) the deglutition of the prey of this voracious fish is thus facilitated, and its escape prevented. The broad and generally bifurcate bony base of the teeth of sharks is attached by ligament to the semiossified crust of the cartilaginous jaws; but they have no power of erecting or depressing the teeth at will. The small and closely crowded teeth of rays, are also connected by ligaments to the subjacent maxillary and mandibular membranes. The broad tesselated teeth of the *mylobates*, have their attached surface longitudinally grooved to afford them better hold-fast, and the sides of the contiguous teeth are articulated together by serrated or finely undulating sutures, a structure unique in dental organization. The teeth of the *sphyræna* are examples of the ordinary implantation in sockets, with the addition of a slight anchylosis of the base of the fully-formed tooth with the alveolar parietes; and the compressed rostral teeth of the saw-fish are deeply implanted in sockets. In the latter, the hind margin of their base is grooved, and a correspoding ridge from the back part of the socket fits into the groove, and gives additional fixation to the tooth. Some implanted teeth in the present class, have their hollow base further supported, like the claws of the feline tribe, upon a bony process arising from the base of the socket; the incisors of the balistes, *e. g.* afford an example of this double or reciprocal gomphosis. In fact, the whole of this part of the organization of fishes is replete with beautiful instances of design, and instructive illustrations of animal mechanics. The vertical section of a pharyngeal jaw and teeth of the wrasse (labrus) would afford the architect a model of a dome of unusual strength, and so supported as to relieve from pressure, the floor of a vaulted chamber beneath. The base of the dome-shaped tooth is slightly contracted, and is implanted in a shallow circular cavity; the rounded margin of which is adapted to a circular groove in the contracted part of the base; the margin of the tooth which immediately transmits the pressure of the bone, is strengthened by an inwardly projecting convex ridge.

The masonry of this inner buttress, and of the dome itself, is composed of hollow columns, every one of which is placed so as best to resist or transmit in the due direction the external pressure. The floor of the alveolus is thus relieved from the office of sustaining the tooth: it forms, in fact, the roof of a lower vault, in which the germ of a successional tooth is in course of development; had the crushing tooth in use, rested, as in the wolf-fish, by the whole of its base upon the alveolus, the supporting plate, gradually undermined by the growth of the new tooth, must have given way, and been forced upon the subjacent delicate and highly vascular and sensitive matrix of the half-formed tooth. But the superincumbent pressure is exclusively sustained by the border of the alveolus, whence it is transferred to the walls dividing the vaulted cavities containing the germs of the new teeth; the roofs of these cavities yield to the absorbent process consequent on the growth of the new teeth without materially weakening the attachment of the old teeth, and without the new teeth being subjected to any pressure, until their growth is sufficiently advanced to enable them to bear it with safety; by this time the sustaining borders of the old alveolus are undermined, and the old worn-down tooth is shed.

The singular and powerfully developed dental system of the wolf-fish (*anarrhichas lupus*) has been a subject of interest to many anatomists. The general character and physiological relations of the teeth in this species had not escaped the attention of Hunter. In his paper on the gillaroo trout, read before the Royal Society in 1774, he observes that "the teeth of fishes which subsist chiefly on animal matter must vary according as their food may be common salt fish, or shell-fish." "Such fish as live on the first kind have, like the carnivorous quadrupeds and birds, no apparatus for mastication, their teeth being intended merely for catching the food and fitting it to be swallowed. But the shells of the second kind of food render some degree of masticatory power necessary to fit it for its passage either into the stomach or through the intestines: and accordingly we find in certain fish a structure suited to the purpose.

Thus the mouth of the wolf-fish is almost paved with teeth, by means of which it can break shells to pieces, and fit them for the œsophagus of the fish, and so effectually disengage the food from them, that though it lives upon such hard food, the stomach does not differ from that of other fish."

But in order to secure the capture of the shell-fish, the teeth of the wolf-fish are not all crushers; some present the laniary type, with the apices more or less recurved and blunted by use, and consist of strong cones spread abroad, like grappling hooks, at the anterior part of the mouth.

The premaxillary teeth are all conical, and arranged in two rows; there are two, three, or four in the exterior row, at the mesial half of the bone, which are the largest; and from six to eight smaller teeth are irregularly arranged behind. There are three large, strong, diverging laniaries at the anterior end of each premandibular bone, and immediately behind these an irregular number of shorter and smaller conical teeth, which gradually exchange this form for that of large obtuse tubercles; these extend backwards, in a double alternate series, along a great part of the alveolar border of the bone, and terminated by two or three smaller teeth in a single row, the last of which again presents the conical form. Each palatine bone supports a double row of teeth, the outer ones being conical and straight, and from four to six in number, the inner ones, two, three or four in number, and tuberculate. I have seen a specimen where the inner row was wanting on one side. The lower surface of the vomer is covered by a double irregularly alternate series of the same kind of large tuberculate crushing teeth as those at the middle of the premandibular. All the teeth are anchylosed to more or less developed alveolar eminences, like the anterior teeth of the lophius. The periphery of the expanded circular base of the large anterior grappling teeth is divided into processes indicative of the original ligamentous fasciculi at the base of the pulp by the ossification of which their anchylosis is effected.

When such anchylosed teeth and the supporting bone are divided by a vertical section, as in fig. 2, pl. 66, of my "Odon-

tography," there may be generally discerned a faint transverse line indicating the original separation between the tooth and the bone, and more clearly defining the dental from the osseous structure, than in the anchylosed teeth of other fishes. From the enormous development of the muscles of the jaws, and the strength of the shells of the whelks and other testacea which are cracked and crushed by the teeth, their fracture and displacement must obviously be no unfrequent occurrence; and most specimens of the jaws of the wolf-fish exhibit some of the teeth either separated at this line of imperfect anchylosis, or, more rarely, broken off above the base, or, still more rarely, detached by fracture of the supporting osseous aveolar process.

With regard to the substance of the teeth of fishes, the modifications of dentine, called vaso-dentine and osteo-dentine, predominate much more than in the higher vertebrata; and they thus more closely resemble the bones which support them. There is, however, great diversity in respect of substance. The teeth of most of the chætodonts are flexible, elastic, and composed of a yellowish subtransparent albuminous tissue; such, likewise, are the labial teeth of the helostome, the premaxillary and mandibular teeth of the goniodonts, and of that percoid genus thence called trichodon. In the cyclostomes, the teeth consist of a denser albuminous substance. The upper pharyngeal molar of the carp consists of a peculiar brown and semi-transparent tissue, hardened by salts of lime and magnesia. The teeth of the flying-fish, (exocætus,) and sucking-fish, (remora,) consist of osteo-dentine. In many fishes, e. g. the acanthurus, sphyræna, and certain sharks (lamna,) a base, or body of osteo-dentine is coated by a layer of true dentine, but of unusual hardness, like enamel: in prionodon this hard tissue predominates. In the labrus the pharyngeal crushing teeth consist wholly of hard, or unvascular dentine. In most pycnodonts and cestracionts, and many other fishes, the body of the tooth consists of ordinary unvascular dentine, covered by a modification of that tissue which I have called "vitro-dentine" from its clear, polished, enam-

el-like character; but this is not enamel, nor the product of a distinct organ from the dentinal pulp; it differs from ordinary dentine in the greater proportion of the mineral particles, their more minute diffusion through the gelatinous basis, in the straighter course and more minute size of the calcigerous tribes; it results from the calcification of the external layer of the dentinal pulp, and is the first part of tooth which is formed. In sargus and balistes the body of the tooth consists of true dentine, and the crown is covered by a thick layer of a denser tissue, developed by a distinct organ, and differing from the "enamel" of higher animals only in the more complicated and organised mode of deposition of the earthy salts. The ossification of the capsule of the complex matrix of these teeth covers the enamel with a thin coating of "cement." In the pharyngeal teeth of the scarus a fourth substance is added by the ossification of the base of the pulp after its summit and periphery have been converted into hard dentine; and the teeth, thus composed of cement, enamel, dentine and osteo-dentine, are the most complex in regard to their substance that have yet been discovered in the animal kingdom.

The tubes which convey the capillary vessels through the substance of the osteo- and vaso-dentine of the teeth of the fishes* were early recognised, on account of their comparatively large size; as by André, e. g. in the teeth of acanthurus, and by Cuvier and Von Born in the teeth of the wolf-fish and other species. Leeuwenhoek had also detected the much finer tubes of the peripheral dentine of the teeth of the haddock. These "dentinal tubuli" are given off from the parietes of the vascular canals, and bend, divide, and subdivide rapidly in the hard basis-tissue of the interspaces of those canals in osteo-dentine; the dental tubuli alone are found in true dentine, and they have a straighter and more parallel course,

* The vaso-dentine of pristis and myliobates is like that of the teeth of the cape ant-eater (orycteropus:) the vaso-dentine of the psammodonts resembles that which forms the base of the tooth of the sloth and megatherium: the vaso-dentine of mammals differs from the osteo-dentine in the absence of the radiated "Purkinjian," cells.

usually at right angles to the outer surface of the dentine. Those conical teeth which, when fully formed, consist wholly, or in great part, of osteo-dentine or vaso-dentine, always first appear with an apex of hard or true dentine. In some fishes the simple central basal pulp-cavity of such teeth, instead of breaking up into irregular or parallel canals, sends out a series of vertical plates from its periphery, which, when calcified, give a fluted character to the base of the tooth, e. g. in lepidosteus oxyurus.* Sometimes such radiating vertical basal plates of dentine are wavy in their course, and send off narrow processes from their sides; and, as a thin layer of the outer capsule interdigitates with the outstanding plates of the dentinal pulp, and becomes co-calcified with them, a transverse section of such a tooth presents a series of interblended wavy, or labyrinthic tracks of thick dentine radiating from the center, and of thin cement converging to the center of the tooth.† An analogous but more complicated structure obtains when the radiating, wavy, vertical plates of dentine dichotomise, and give off from their sides, throughout their course, numerous branch plates and processes, which are traversed by medullary sinuses and canals with their peripheral terminations dilated, and becoming the centers of lobes or columns of hard dentine. The transverse section of such teeth gives the appearance of branches of a tree, with leaf-stalks and leaves, radiating from the central pulp-cavity to the circumference of the tooth; and

* Wyman, American Journal of Natural Sciences, Oct. 1843. Cuvier has given an accurate view of the plaited structure of the base of the wolf-fish's teeth in pl. 32, fig. 7, of his Leçons d'Anatomie Comparée, 1805; where it is described at the base of the osseous tubercle, which supports the true tooth.

† This remarkable structure attains its highest complication and forms the largest proportion of the tooth in the gigantic extinct labyrinthodont batrachia, and from which, therefore, I have taken the illustrations of that complex modification of dental structure. I had discovered in 1841, the more simple modification of this structure "at the base of the tooth in a few fishes" (Geol. Trans., 2d series, vol. vi., p. 507,) but had not then seen so complex an example in that class as Dr. Wyman and M. Agassiz (Recherches sur les Poissons Fossiles, "Sauroides" 1843) subsequently described and figured, in teeth of the genus lepidosteus.

I have called the fossil fish in which this structure was first detected, dendrodus.

Thus, with reference to the main and fundamental tissue of teeth; we find not fewer than six leading modifications in fishes; hard or true dentine, (sparoids, labroids, lophius, balistes, pycnodonts, prionodon, sphyræna, megalichthys, rhizodus, diodon, scarus;) osteodentine, (cestracion, acrodus, lepidosiren, ctenodus, hybodus, percoids, sciænoids, cottoids, gobioids, and many others;) vaso-dentine, (psammodus, chimæroids, pristis, myliobates;) plici-dentine, (lophius, holoptychius, lepidosteus oxyurus, at the base of the teeth;) labyrinthodentine, (lepidosteus, platyrhinus, bothriolepis;) and dendrodentine, (dendrodus;) besides the compound teeth of the scarus and diodon.

One structural modification may prevail in some teeth, another in other teeth of the same fish; and two or more modifications may be present in the same tooth, arising from changes in the process of calcification and a persistency of portions or processes of the primitive vascular pulp or matrix of the dentine.

The dense covering of the beak-like jaws of the parrot-fishes, (scari,) consists of a stratum of prismatic denticles, standing almost vertically to the external surface of the jaw-bone. An account of the structure and development of this peculiar armature of the jaws is abridged from my "Odontography" p. p. 112—116, in the article Pisces, vol. iii. p. 979. It is peculiarly adapted to the habits and exigencies of a tribe of fishes which browse upon the lithophytes that clothe, as with a richly tinted carpet, the bottom of the sea, just as the ruminant quadrupeds crop the herbage of the dry land.

The irritable bodies of the gelatinous polypes which constitute the food of these fishes retract, when touched, into their star-shaped stony shells, and the scari consequently require a dental apparatus strong enough to break off or scoop out these calcareous recesses. The jaws are, therefore, prominent, short, and stout, and the exposed portions of the premaxillaries and premandibulars are encased by complicated dental covering.

The polypes and their cells are reduced to a pulp by the action of the pharyngeal jaws and teeth, that close the posterior aperture of the mouth.

The superior dentigerous pharyngeals, *figs.* 15 and 22, present the form of an elongated, vertical, inequilateral, triangular plate; the upper and posterior margin is sharp and concave; the upper and anterior margin forms a thickened articular surface, convex from side to side, and playing in a corresponding groove or concavity upon the base of the skull; the inferior boundary of the triangle is the longest, and also the broadest; it is convex in the antero-posterior direction, and flat from side to side. It is on this surface, that the teeth are implanted, and in most species they form two rows; the outer one consisting of very small, the inner one of large dental plates, which are set nearly transversly across the lower surface of the pharyngeal bone, and are in close apposition, one behind the other: their internal angles are produced beyond the margin of the bone, and interlock with those of the adjoining bone when the pharyngeals are in their natural position; the smaller denticles of the outer row are set in the external interspaces of those of the inner row.

The single inferior pharyngeal bone consists principally of an oblong dentigerous plate, of the form represented in *fig.* 3, pl. 51, of my "Odontography;" its breadth somewhat exceeds that of the conjoined dentigerous surface of the pharyngeals above, and it is excavated to correspond with their convexity. This dentigerous plate is principally supported by a strong, slightly curved, transverse, osseous bar, the extremities of which expand into thick obtuse processes for the implantation of the triturating muscles. A longitudinal crest is continued downwards and forwards from the middle line of the inferior pharyngeal plate, anterior to the transverse bar, to which the protractor muscles are attached.

A longitudinal row of small oval teeth alternating with the large lamelliform teeth, like those of the superior pharyngeals, bounds the dentigerous plate on each side; the intermediate space is occupied exclusively by the larger lamelliform or

wedge-shaped teeth, set vertically in the bone, and arranged transversely in alternate and pretty close set series.

The dental plates are developed in wide and deep cavities in the substance of the posterior part of the lower, and of the anterior part of the upper pharyngeal bones. Each denticle is developed in its proper capsule, which contains an enamel-forming pulp and a dentinal pulp, in close cohesion with each other, and with the thin external capsule. The teeth exhibit progressive stages of formation, as they approach the posterior part of the upper and the anterior part of the lower pharyngeal bones: as their formation advances to completion they become soldered together by ossification of their respective capsules into one compound tooth, which soon becomes anchylosed by ossification of the dentinal pulp to the pharyngeal bone itself.

The dentine of the pharyngeal teeth of the scarus consists of calcigerous tubes, and a clear intermediate substance. The calcigerous tubes average a diameter of $\frac{1}{10,000}$ of an inch, and are separated by interspaces equal to twice their own diameter. The course of these tubes is shown in *fig.* 15, *d*, in which they are exposed by a vertical section through the middle of two of the superior denticles. They all, on leaving the pulp cavity, form a curve with the convexity turned towards the base of the tooth, and then bend slightly in the opposite direction; the sigmoid curve being most marked in the calcigerous tubes at the base of the denticles, whilst those towards the apex become longer and straighter. Besides the primary curvatures exemplified in the figure, each calcigerous tube is minutely undulated; it dichotomises three or four times near its termination, sends off many fine lateral branches into the clear uniting substance, and finally terminates in a series of minute cells and inosculating loops at the line of junction with the enamel.

This substance (fig. 15, *e.*) is as thick as the dentine, and consists of a similar combination of minute tubes, and a clear connecting substance. The tubes may be described as commencing from the peripheral surface of the tooth to which they stand at right angles, and, having proceeded parallel to

each other halfway towards the dentine, they then began to divide and subdivide, the branches crossing each other obliquely, and finally terminating in the cellular boundary between the enamel and dentine.

The teeth which present this complex structure are successively developed at one extremity of the bone, in proportion as they are worn away at the other; not, however, as Cuvier describes, from behind forwards, in both upper and lower pharyngeal bones, but in opposite directions in the opposite bones, the course of succession being from before backwards in the upper, and from behind forwards in the lower pharyngeal bones. In the progress of the attrition to which they are subjected, the thin coat of cement resulting from the ossification of the capsule is first removed from that apex of the tooth, then the enamel constituting the apex, next the dentine, and finally, the coarse central cellular bone, supporting the hollow wedge-shaped tooth; and thus is produced a triturating surface of four different substances of different degrees of density. The enamel, being the densest element, appears in the form of elliptical transverse ridges, inclosing the dentine and central bone; and external to the enamel is the cement which binds together the different denticles.

There is a close analogy between the dental mass of the scarus and the complicated grinders of the elephant, both in form, structure, and in the reproduction of the component denticles in horizontal succession. But in the fish, the complexity of the triturating surface is greater than in the mammal, since, from the mode in which the wedge-shaped denticles of the scarus are implanted upon, and anchylosed to, the processes of the supporting bone, this likewise enters into the formation of the masticatory surface when the tooth is worn down to a certain point.

The proof of the efficacy of the complex masticatory apparatus above described is afforded by the contents of the alimentary canal of the scari. Mr. Charles Darwin, the accomplished naturalist and geologist, who accompanied Captain Fitzroy, R. N., in the circumnavigatory voyage of the "Beagle,"

dissected several parrot-fishes soon after they were caught, and found the intestines laden with nearly pure chalk, such being the nature of their excrements; whence he ranks these fishes among the geological agents to which is assigned the office of converting the skeletons of the lithophytes into chalk.

Development.—As might have been anticipated from the discovery of the varied and predominating vascular organization in the teeth of fishes, and the passage from non-vascular dentine to vascular dentine in the same tooth, the true law of the development of dentine "by centripetal metamorphosis and calcification of the cells of the pulp," was first definitely enunciated and illustrated from observations made on the development of the teeth of fishes.*

It is interesting to observe in this class the process arrested at each of the well marked stages through which the development of a mammalian tooth passes. In all fishes the first step is the simple production of a soft vascular papilla from the free surface of the buccal membrane: in sharks and rays these papillæ do not proceed to sink into the substance of the gum, but are covered by caps of an opposite free fold of the buccal membrane: these caps do not contract any organic connection with the papilliform matrix, but, as this is converted into dental tissue, the tooth is gradually withdrawn from the extraneous protecting cup, to take its place and assume the erect position on the margin of the jaw, (article PISCES, vol. iii, page 976.) Here, therefore, is represented the first and transitory "papillary" stage of dental development in mammals; and the simple crescentic cartilaginous maxillary plate, with the open groove behind containing the germinal papillæ of the teeth, offers in the shark a magnified representation of the earliest condition of the jaws and teeth in the human embryo.

In many fishes, e. g. *lophius esox*, the dental papillæ become buried in the membrane from which they rise, and the surface

* In my Hunterian Lectures, delivered at the Royal College of Surgeons, May, 1839. See also, Compte Rendu de l'Académie des Sciences, Dec. 1839, p. 784; and Odontography, Introduction and part i, *passim*.

to which their basis is attached becomes the bottom of a closed sac: but this sac does not become inclosed in the substance of the jaw; so that teeth at different stages of growth are brought away with the thick and soft gum, when it is stripped from the jaw-bone. The final fixation of teeth, so formed, is effected by the development of ligamentous fibres in the sub-mucous tissue between the jaw and the base of the tooth, which fibres become the medium of connection between those parts, either as elastic ligaments, or by continuous ossification. Here, therefore, is represented the "follicular" stage of the development of a mammalian tooth; but the "eruptive" stage takes place without previous inclosure of the follicle and matrix in the substance of the jaw-bone.

In balistes, scarus, sphyræna, the sparoids, and many other fishes, the formation of the teeth presents all the usual stages which have been observed to succeed each other in the dentition of the higher *vertebrata:* the papilla sinks into a follicle, becomes surrounded by a capsule, and is then included within a closed alveolus of the growing jaw, where the development of the tooth takes place and is followed by the usual eruptive stages. A distinct enamel-pulp is developed from the inner surface of the capsule in balistes, scarus, sargus, and chrysophrys.

The most formidable dentition exhibited in the order of osseous fishes, is that which characterises the sphyræna, and some extinct fishes allied to this predatory genus. In the great barracuda of the southern shores of the United States, (sphyræna barracuda, Cuv.,) the lower jaw contains a single row of large, compressed, conical, sharp-pointed, and sharp-edged teeth, resembling the blades of lancets, but stronger at the base. The two anterior of these teeth are twice as long as the rest, but the posterior and serial teeth gradually increase in size towards the back part of the jaw; there are about twenty-four of these piercing and cutting teeth in each premandibular bone. They are opposed to a double row of similar teeth in the upper jaw, and fit into the interspace of these two rows when the mouth is closed. The outermost row is situated on

the intermaxillary, the innermost on the palatine bones; there are no teeth on the vomer or superior maxillary bones. The two anterior teeth in each premaxillary bone, equal the opposite pair in the lower jaw in size: the posterior teeth are serial, numerous and small size; the second of the two anterior large premaxillary teeth is placed on the inner side of the commencement of the row of small teeth, and is a little inclined backwards. The retaining power of all the large anterior teeth is increased by a slight posterior projection, similar to the barb of a fish hook, but smaller. The palatine bones contain each nine or ten lancet-shaped teeth, somewhat larger than the posterior ones of the lower jaw. All these teeth afford good examples of the mode of attachment by implantation in sockets, which has been denied to exist in fishes.

The loss or injury to which these destructive weapons are liable in the conflict which the sphyræna wages with its living and struggling prey is repaired by an uninterrupted succession of new pulps and teeth. The existence of these is indicated by the foramina, which are situated immediately posterior to, or on the inner margin of, the sockets of the teeth in place; these foramina lead to alveoli of reserve, in which the crowns of the new teeth in different stages of development are loosely imbedded. It is in this position of the germs of the teeth, that the sphyrænoid fishes, both recent and fossil, mainly differ, as to their dental characters, from the rest of the scomberoid family, and proportionally approach the sauroid type. The base or fang of the fully-developed tooth of the sphyræna, is anchylosed to the parietes of the socket in which it is inserted. The pressure of the crown of the new tooth excites absorption of the inner side of the base of the old, which thus finally loses the requisite strength of attachment; and its loss is followed by the absorption of the old socket, as in the higher animals.

It is interesting to observe that the alternate teeth are, in general, contemporaneously shed; so that the maxillary armor is always preserved in an effective state. The relative position of the new teeth to their predecessors, and their influence upon

them, resembles, in the *sphyrena*, some of the phenomena which will be described in the dentition of the crocodilian reptiles. To the crocodiles the present voracious fish also approximates in the alveolar lodgment of the teeth; but it manifests its ichyic character in the anchylosis of the fully-developed teeth to their sockets, and still more strikingly in the intimate structure of the teeth.

In all fishes the teeth are shed and renewed, not once only, as in mammals, but frequently, during the whole course of their lives. The maxillary dental plates of *lepidosiren*, the cylindrical dental masses of the chimæroid and edaphodont fishes, and the rostral teeth of *pristis*, if these modified dermal spines may be so called, are, perhaps, the sole examples of "permanent teeth" to be met with in the whole class.

When the teeth are developed in alveolar cavities, they are usually succeeded by others in the vertical direction, as in the pharyngeal bones of the labroids (article Pisces, vol. iii. page 978;) but sometimes they follow one after the other, side by side, as in the scaroids (Pisces, page 979.) The successional teeth owe the origin of their matrix to the budding out from the capsule of their predecessors of a cæcal process, in which the papillary rudiment of the dentinal pulp is developed according to the laws explained in the introduction to my "Odontography," and the article TOOTH. But, in the great majority of fishes, the germs of the new teeth are developed, like those of the old, from the free surface of the buccal membrane throughout the entire period of succession; a circumstance peculiar to the present class. The angler, the pike, and most of our common fishes, illustrate this mode of dental reproduction; it is very conspicuous in the cartilaginous fishes, in which the whole phalanx of their numerous teeth is ever marching slowly forwards in rotatory progress over the alveolar border of the jaw, the teeth being successively cast off as they reach the outer margin, and new teeth rising from the mucous membrane behind the rear rank of the phalanx.

This endless succession and decadence of the teeth, together with the vast numbers in which they often coexist in the same

fish, illustrate the law of vegetative or irrelative repetition, as it manifests itself on the first introduction of new organs in the animal kingdom, under which light we must view the above described organized and calcified preparatory instruments of digestion in the lowest class of the vertebrate series.

At the extreme limit of the class of fishes, and connecting that class with the reptiles, stands the very remarkable genus, the dental system of which is figured in cut 17. This consists of two small, slender, conical, sharp-pointed, and slightly recurved teeth, which project downwards from the nasal bone (*c*,) and of strong, trenchant dental plates anchylosed with the alveolar border of the upper (*a*) and lower (*b*) jaws, in each of which the plate is divided at the middle, or symphysial line, so as to form two distinct lateral teeth.

The office of the two laniariform teeth is to pierce and retain the nutritive substance or prey which is afterwards divided and comminuted by the strong maxillary dental plates.

The upper pair of these plates is supported by the anterior part of a strong arch of bone, which combines the characters of the superior maxillary, palatine, and pterygoid bones; the superior maxillary is represented by the median and anterior bar, passing in front of the dental plate of the lower jaw when the mouth is shut, terminating on each side in a process which projects outwards and backwards, as in fig. 17, (*a*,) on each side of the anterior part of the arch; the palatine portion constitutes the median part of the roof of the mouth behind the foregoing; the pterygoid portion is indicated by its fulfilling the usual function of an abutment extended between the palatine portion of the upper jaw and the articular pedicle of the lower jaw; the upper dental plates are confined to the first two parts of the arch, maxillary and palatine, and do not extend upon the pterygoid portion; the lower dental plates (*b*) are anchylosed to the premandibular bone. Viewing the upper pair of plates as a single tooth, it may be described as indented at its outer surface by five vertical angular notches, penetrating inwards through half the breadth of the supporting bone, and dividing the plate into six angular processes, which from the

direction and varying form and breadth of the entering notches, radiate from the posterior part of the median line or division of the tooth. The inferior dental plate is similarly notched on its outer side, but the proportions of the angular indentations are such that they receive all the processes of the upper dental plate when the mouth is shut, whilst only the four anterior processes are reciprocally received into the notches of the upper dental plate, this, with the supporting arch, being anterior to the lower plate—a position which is decisive in favor of its maxillary character, and against its homology with the vomer.

The dental plate consists, as in the cod and *sphyræna*, of a central mass of coarse osseous substance, traversed by large and nearly parallel medullary canals, and an external sheath of very hard "vitro-dentine." The medullary canals are continued from a coarse reticulation of similar but wider canals in the substance of the supporting bone, and advance forwards, nearly parallel with each other and with the plane of the upper surface of the tooth ; they anastomose together by short, curved, transverse canals, which intercept spaces increasing in length as the canals recede from the osseous basis. The canals, themselves, diminish in size in the same ratio ; and when they have arrived near the dense outer layer, their divisions and inosculations become again more frequent, the peripheral loops forming a well-marked line of demarcation between the coarse tubed and the fine tubed dentine. The interspaces of the medullary canals are occupied by a clear substance, and by moss-like reticulations of fine dental tubes, which appear to be more sparing in number than in the teeth of the *sphyræna* or shark. The dentinal tubes of the vitro-dentine run nearly parallel to each other, and vertically to the external surface of the dental plate through about two-thirds of the thickness of that tissue ; they then bend and cross each other in a manner very similar to those of the vitro-dentine in the teeth of the *lepidotus*, *phyllodus*, &c.

In the process of attrition this external dense substance is worn away from the upper surface of the dental processes in the lower jaw, exposing the softer vaso-dentinal substance of

the tooth; in this state, the dental plate offers an analogy to the incisors of the rodents, a posterior softer substance being sheathed by an anterior denser layer; and an external sharp edge is similarly kept up by the unequal wearing away of the two substances. The progressive waste at the upper surface of the dental plate, would appear to be met by a corresponding addition of new material to its lower part.

In the structure here presented, we have a condition of the dentine which has hitherto been met with only in the class of fishes.

The test of the affinities of the present paradoxical genus, afforded by the microscopic examination of the teeth, gives additional confirmation to the view to which I have been led, from arguments drawn from the rest of its organization, that the *lepidosiren* is in every essential point, a member of the class of fishes.*

Dental System of Reptiles.

If we compare the dental system of the foregoing batrachoid fish with that in the true *batrachia*, it is only to the larval state of the anourans that an analogy can be found; the tadpole of the frog having its maxilla and mandibula each sheathed with a single and continuous horny dental trenchant covering. Were this sheath actually dentinal in tissue and united to the jaw-bone, the resemblance to the *lepidosiren* would be closer; but in point of fact the analogy is very remote; the horny beak of the tadpole is never calcified or anchylosed, but is shed during the progress of the metamorphosis.† The siren alone, among

* Linnean Transactions, vol. xviii, 1839, p. 350. That the large size, or elliptical form of its blood-discs should outweigh the cumulative evidence establishing the piscine nature of the *lepidosiren* could only be surmised by those who are ignorant of the variation in size and shape which the blood-discs present in the class of fishes, and the consequent unimportance of those particles as a character of the class. As well might the *petromyzon* be deemed a mammal because its blood-discs are circular and comparatively small, as the *lepidosiren* be held to be a batrachian because its blood-discs are elliptical and comparatively large.

† The large dental plates of *lepidosiren* have their nearest homologues in those of the extinct fish called *ceratodus* (Odontography, pl. 22, fig. 2.)

the larval-like perennibranchiate reptiles, retains the sheath upon the extremity of the upper and lower jaws; it consists of a firm albuminous tissue, and becomes harder than horn. But these trenchant mandibles, which play upon one another like the blades of a pair of curved scissors, are associated with numerous small but distinct true teeth, which are grouped together to form a rasp-like surface on each half of the divided vomer, and which beset the alveolar border of the splenial element of the mandible below.

In the class *reptilia*, the whole order of *chelonia* is edentulous, as well as the whole family of toads (bufonidæ) in the order *batrachia;* certain extinct genera of saurians were likewise edentulous, *e. g.* the remarkable "*rhynchosaurus*" of the new red sandstone of Shropshire, and some of the extinct saurians of South Africa.

In the tortoises and turtles the jaws are covered by a sheath of horn, which in some species is of considerable thickness and very dense; its working surface is trenchant in the carniverous species, but variously sculptured, and adapted for both cutting and bruising in the vegetable feeders; it may be said that the transitory condition of the mandibles of the batrachian larvæ is here persistent.

The development of the continuous horny maxillary sheath commences, as in the parrot tribe, from a series of distinct papillæ, which sink into alveolar cavities, regularly arranged (in *trionyx*) along the margins of the upper and lower jaw-bones: these alveoli are indicated by the persistence of vascular canals long after the originally separate tooth-like cones have become confluent, and the horny sheath completed.

The teeth of the dentigerous saurian, ophidian, and batrachian reptiles, are, for the most part, simple and adapted for seizing and holding, but not for dividing or masticating their food. The siren alone, combines true teeth with a horny maxillary trenchant sheath, like that of the chelonian reptiles.

With respect to number, in no existing reptile are the teeth reduced so low as in certain mammals and fishes; nor, on the other hand, are they ever so multiplied as in many of the lat-

ter class. The extinct dicynodont reptiles of South Africa had but two teeth, which were long tusks implanted in the upper jaw. Some species of amphisbæna, (A. alba,) with fifteen teeth in the upper jaw, and fourteen in the lower jaw, and certain monitors, (varanus,) with sixteen teeth in the upper, and fourteen in the lower jaw, afford examples of the smallest number of teeth amongst existing reptiles; and certain batrachians, with teeth "en cardes" at the roof of the mouth, or which have upwards of eighty teeth in each lateral maxillary series, present the largest number. It is rarely that the number of the teeth is fixed and determinate in any reptile so as to be characteristic of the species, and still more rarely have the individual teeth such characters as to be determined homologically from one species to another.

With respect to situation, the teeth may be present on the jaws only, i. e. the maxillary, premaxillary, and mandibular bones, as in the crocodiles and many lizards: or upon the jaws and roof of the mouth; and here either upon the pterygoid bones, as in the iguana and mosasaur, or upon both palatine and pterygoid bones, as in most serpents, or upon vomer, as in most batrachians, or upon both vomerine and pterygoid bones, as in the axolote, or upon the vomerine and sphenoid bones, as in the salamandra glutinosa, maclure. With respect to the marginal or jaw teeth, these may be absent in the intermaxillary bones, as in many serpents; or they may be present in the upper and not in the lower jaw, as in most frogs; or in both upper and lower jaws, as in the tailed batrachians; and among these they may be supported, upon the lower jaw, by the premandibular or dentary piece, as in the salamanders, menopome, amphiume, proteus; or upon the splenial piece, as in the siren; or upon both splenial and premandibular bones, as in the axolote. The palatine and pterygoid teeth may, in the batrachians, be arranged in several rows, like the "dents en cardes" of fishes. The sphenoid and splenial teeth are always so arranged in the few species that possess them. The intermaxillary, maxillary, and premandibular teeth are uniserial, or in one row, with the exception of the

cæcilia and the extinct labyrinthodonts, which have a double row of teeth at the anterior part of the lower jaw.

The teeth of reptiles, with few exceptions, present a simple conical form, with the crown more or less curved, and the apex more or less acute. The cone varies in length and thickness; its transverse section is sometimes circular, but more commonly elliptical or oval, and this modification of the cone may be traced through every gradation, from the thick, round, canine-like tooth of the crocodile, to the sabre-shaped fang of the varanus, the megalosaur, and the cladeiodon. Sometimes as in the fully formed teeth of the megalosaur, one of the margins of the compressed crown of the tooth is trenchant, sometimes both are so; and these may be simply sharp-edged, as in the varanus of timor, or finely serrated, as in the great varanus, the cladeiodon, and the megalosaur.

The outer surface of the crown of the tooth is usually smooth; it may be polished, as in the leiodon, or impressed with fine lines, as in the labyrinthodon, or raised into many narrow ridges, as in the pleiosaur and polyptychodon, or broken by a few broad ridges, as in the iguanodon, (fig. 28,) or grooved by a single longitudinal furrow, as in some serpents, (fig. 26, *a.)*

The cone is longest, and its summit sharpest, in the serpents; from these may be traced, chiefly in the lizard tribe, a progressive shortening, expansion of the base, and blunting of the apex of the tooth, until the cone is reduced to a hemispherical tubercle, or plate, as in the thorictes and cyclodus, (fig. 27.)

In the pleiosaur the dental cone is three-sided, with one of the angles rounded off. The posterior sub-compressed teeth of the alligator, (fig. 30,) present a new modification of form; here they terminate in a mammillate summit, supported by a slightly constricted neck. In the tooth of the hylœosaur, the expanded summit is flattened, bent, and spear-shaped, with the edges blunted. But the expansion of the crown is greatest in the sub-compressed teeth of the extinct cardiodon and the existing iguanas, the teeth of which are farther complica-

ted by having the margins notched. The great iguanodon had the crown of the tooth expanded, both in length and breadth, and combining marginal dentations with longitudinal ridges: this tooth, (fig. 28,) presents the most complicated external form as yet discovered in the class of reptiles.

In no reptiles does the base of the tooth ever branch into fangs.

Attachment.—As a general rule, the teeth of reptiles are anchylosed to the bone which supports them. When they continue distinct, they may be lodged either in a continuous groove, as in the ichthyosaur, or in separate sockets, as in the plesiosaur and crocodilians (fig. 30.) The base of the tooth is anchylosed to the walls of a moderately deep socket in the extinct megalosaur and theocodon. In the labyrinthodonts and cæciliæ, among the bratrachians; in most ophidians; and in the geckos, agamians, and varanians, among the saurians, the base of the tooth is imbedded in a shallow socket, and is confluent therewith.

In the scincoidians, the safeguards, (tejus,) in most iguanians, in the chameleons and most other lacertian reptiles, the tooth is anchylosed by an oblique surface extending from the base more or less upon the outer side of the crown to an external alveolar plate of bone, the inner alveolar plate not being developed. In the frogs, the teeth are similarly, but less firmly attached to an external parapet of bone. The lizards, which have their teeth thus attached to the side of the jaw are termed pleurodonts. In a few iguanians, as the istiures, the teeth appear to be soldered to the margins of the jaws, these have been termed "acrodonts." In some large extinct lacertians, *e. g.* the mosasaur and leiodon, the tooth is fixed upon a raised conical process of bone. These modifications of the attachment of the teeth of reptiles are closely adapted to the destined application of those instruments, and relate to the habits and food of the species; we may likewise perceive that they offer a close analogy to some of the transitory conditions of the human teeth. There is a period, for example, when the primitive dental papillæ are not defended by either an outer or an inner alveolar

process, any more than their calcified homologues which are confluent with the margin of the jaw in the rhynchocephalus. There is another stage in which the groove containing the dental germs is defended by a single external cartilaginous alveolar ridge; this condition is permanetly typified in the cyclodus, (fig. 27, and most existing lizards. Next there is developed in the human embryo an internal alveolar plate, and the sacs and pulps of the teeth sink into a deep, but continuous groove, in which traces of transverse partitions soon make their appearance; in the ancient ichthyosaur the relation of the jaws to the teeth never advanced beyond this stage.

Finally, the dental groove is divided by complete partitions, and a separate socket is formed for each tooth; and this stage of development is attained in the highest organized reptiles, *e. g.* the crocodiles (fig. 30.)

Substance.—This may be four-fold, and a single tooth may be composed of dentine, cement, enamel, and bone; but the dentine and cement are present in the teeth of all reptiles.

In the batrachians and ophidians, a thin layer of cement invests the central body of dentine, and, as usual, follows any inflections or sinuosities that may characterise the dentine. Besides the outer coat of cement, which is thickest at the base of the teeth, a generally thin coat of enamel defends the crown of the tooth in most saurians, and the last remains of the pulp are not unfrequently converted into a coarse bone, both in the teeth which are anchylosed to the jaw, and in some teeth, as those of the ichthyosaur, which remain free. The only modification of the dentine, which could at all entitle it to be regarded in the light of a new or distinct substance, is that which is peculiar in the present class to the teeth of the iguanodon, and which will be described in the following section.

Structure.—The varieties of dental structure are few in the reptiles as compared with either fishes or mammals, and its most complicated condition arises from interblending of the dentinal and other substances, rather than from modifications of the tissues themselves. In the teeth of most reptiles the intimate structure of the dentine corresponds with that which has

been described as the type of the tissue, *e. g.* the hard or unvascular dentine, and which is the prevailing modification in mammalia, viz. the radiation of a system of minute plasmatic tubes from a single pulp-cavity, at right angles to the external surface of the tooth. The most essential modification of this structure is the intermingling of cylindrical processes of the pulp-cavity in the form of medullary canals, with the finer tubular structure. Another modification is that in which the dentine maintains its normal structure, but is folded inwardly upon itself, so as to produce a deep longitudinal indentation on one side of the tooth; it is the expansion of the bottom of such a longitudinal deep fold that forms the central canal of the venom-fang of the serpent; but a glance at fig. 25, will show that, notwithstanding the singularly modified disposition of the dentine *(b,)* its structure remains unaltered; and although the pulp-cavity *(p)* is reduced to the form of a crescentic fissure, the dentinal tubes continue to radiate from it according to the usual law. By a similar inflection of many vertical longitudinal folds of the external cement and external surface of the tooth at regular intervals around the entire circumference of the tooth, and by a corresponding extension of radiated processes of the pulp-cavity and dentine into the interspaces of such inflected and converging folds, a modification of dental structure is established in certain extinct reptiles, which, by the various sinuosities of the interblended folds of cement and processes of dentine, with the partial dilatations of the radiated pulp-cavity, produces the complicated structure which is described in fig. 9. But this complication is nevertheless referable to a modification of form or arrangement of the dental tissues, rather than of the structure of the tissues themselves: the calcigerous tubes in each sinuous lobe of dentine, in the most complex tooth of the labyrinthodon, exhibit the same general disposition and course, as in the fang of the serpent and in the still more simple tooth of the saurian.

Development.—The teeth of reptiles are never completed, as in certain fishes, at the first or papillary stage; but the pulp sinks into a follicle, and becomes inclosed by a capsule; and

in certain reptiles this becomes more or less surrounded by bone; but the process of development never offers the eruptive stage, in the sense in which this is usually understood, as signifying the extrication of the young tooth from a closed alveolus.

The completion of a tooth, with the extinct exception of the dicynodont reptiles, is soon followed by preparation for its removal and succession: the faculty of developing new tooth-germs seems to be unlimited in the present class, and the phenomena of dental decadence and replacement are manifested at every period of life; the number of teeth is generally the same in each successive series, and the difference of size presented by the teeth of different and distant series is considerable.

The new germ is always developed, in the first instance, at the side of the base of the old tooth, never in the cavity of the base; the crocodiles form no exception to this rule. The poison-fangs of serpents succeed each other from behind forwards; in almost every other instance the germ of the successional tooth is developed at the inner side of the base of its predecessor. In the frog the dental germ makes its appearance in the form of a papilla developed from the bottom and towards the outer side of a small fissure in the mucous membrane or gum that fills up the shallow groove at the inner side of the alveolar parapet and its adherent teeth: the papilla is soon enveloped by a capsular process of the surrounding membrane: there is a small enamel pulp developed from the capsule opposite the apex of the tooth; the deposition of the earthy salts in this mould is accompanied by ossification of the capsule, which afterwards proceeds *pari passu* with the calcification of the dentinal papilla or pulp; so that, with the exception of its base, the surface of the uncalcified part of the pulp alone remains normally unadherent to the capsule.

As the tooth acquires hardness and size, it presses against the base of the contiguous attached tooth, causes a progressive absorption of that part, and finally undermines, displaces and replaces its predecessor. The number of nascent matrices of the successional teeth is so great in the frog, and they are

crowded so close together, that it is not unusual to find the capsules of contiguous tooth-germs becoming adherent together, as their ossification proceeds. After a brief maceration, the soft gum may be stripped from the shallow alveolar depression, and the younger tooth-germs in different stages of growth are brought away with it.

The mode of development of the teeth of serpents does not differ essentially from that of the teeth of the batrachian above described, except in the relation of the papillæ of the successional poison-fangs to the branch of the poison-duct that traverses the cavity of the loose mucous gum in which they are developed.

Batrachian modifications.—Some of the peculiarities of the dentition of the batrachians have already been noticed, as in the comparison of the *siren* with the *lepidosiren*, in which the true amphibian was shown to have numerous teeth on the palate and lower jaw.

The piscine character of rasp-like teeth aggregated in numerous series, is manifested also in the axolotl, upon the palatal region of the mouth, and upon the splenial or opercular element of the lower jaw; but the superior maxillary bones are here developed, and also support teeth. The premandibular and the premaxillary bones, instead of preserving the larval condition of the horny sheath, have their alveolar border armed with a single row of small, equal, fine and sharp-pointed denticles, which are continued above, along the maxillaries; thus establishing the commencement of the ordinary batrachian condition of the marginal teeth of the buccal cavity. The dentigerous bones of the palate consist of two plates on each side, as in the *siren;* the anterior pair, or vomerine bones, converge and meet at their anterior extremities; the minute denticles which they support are arranged quinceuncially; the posterior pair of bones are continued backwards according to the usual disposition of the pterygoids, to abut against the tympanic bones; the denticles are confined to the anterior part of their oral surface, and resemble in their arrangement and anchylosed attachment those of the vomerine series, of which they form the posterior termination.

The frogs *(rana)* have no teeth on the lower jaw; but in some species the alveolar edge of this bone is finely notched or dentated, as in the horned frogs *(ceratophrys.)* The intermaxillary and maxillary bones support a long, close-set, single series of small, conical, hollow teeth, of which the apices only project beyond the external alveolar ridge to which they are attached. A short transverse row of similar but smaller teeth extends along the posterior border of each vomer, except in the slender-armed frogs, (*leptobrachium*,) and in some of the tree frogs, (e. g. *euchnemes*,) in which the roof of the mouth is edentulous.

Amongst the most extraordinary examples of extinct reptiles, are those which are characterised by the labyrinthic modifications of the dental structure above described, and which with some affinities to saurians, combine characters which are essentially those of the order *batrachia*. I have ascertained by fossil portions of the upper jaw of the *labyrinthodon leptognathus*, that the maxillary or facial division of the skull was broad, much depressed, and flattened, resembling the skull of the gigantic salamander and of the alligator; and the outer surface of the bones was strongly sculptured, as in the crocodilian family, but of a relatively larger and coarser pattern. The upper jaw contains a single row of small teeth, about sixty in number, anterior to which are three or four large conical tusks. The bases of the serial teeth project directly from the outer wall of the shallow socket, there being no alveolar ridge external to it. The second large anterior tusk is three times the size of the first of the serial teeth, and the size of these teeth gradually diminishes as they are placed further back; the length of the common-sized teeth being about two lines, and the greatest breadth one-third of a line. The apical two-thirds of each tooth is smooth, but the basal third is fluted and anchylosed to the outer wall of the socket. The osseous roof of the mouth is principally composed of a pair of broad and flat bones, homologous with the divided vomer in *batrachia*, but of much greater relative extent, approaching in this respect, those of the menopome, and defending the mouth with a more extensive

roof of bone than exists in any lacertian reptile; physiologically, therefore, the *labyrinthodon*, in this part of its structure, comes nearest to the crocodile; but the structure itself, morphologically, is essentially batrachian. In the menopome and gigantic salamander, a row of small teeth extends transversely across the anterior extremity of the vomerine bones; and the occurrence in the *labyrinthodon* of a similar row, consisting in each palatine bone of three median small teeth and two outer large ones, marks most strongly its batrachian nature; and from the outermost tooth, a longitudinal row of small and equal-sized teeth is continued backward along the exterior margin of the palatine bone. The whole of this series of palatal teeth is nearly concentric with the maxillary teeth.

In lacertine reptiles the examples of a row of palatal teeth are rare, and, when present, it is short, and situated towards the back of the palate, upon the pterygoid bones, as in the iguana and mosasaur. In batrachians the most common disposition of the palatal teeth is a transverse row placed at the anterior part of the divided vomer, as in frogs, the menopome, and gigantic salamander, and at the posterior part in certain toads. In the amphiume, on the contrary, the palatal teeth form a nearly longitudinal series along the outer margin of the palatine bones. The labyrinthodon combines both these dispositions of the palatal teeth. The lower jaw, like the upper, contains a series of small teeth, with a few larger tusks anterior to them, the serial teeth are long and slender, gradually diminishing in size towards the anterior portion of the jaw; the largest fossil portion which I have obtained presents a linear series of not less than fifty sockets, placed alternately, one nearer the inner, the next nearer the outer side of the jaw. The sockets of the teeth are shallower than in the upper jaw; the outer wall is more developed than the inner, and the anchylosed bases of the teeth more nearly resemble, in their oblique position, those of existing *batrachia*. With regard to the modification of the microscopic structure of the teeth, I may observe that, between the apex and the part where the inflected vertical folds of the cement commence, the tooth resembles, in

the simplicity of its intimate structure, that of the entire tooth of the ordinary *batrachia* and most reptiles; and in the lower or basal half of the tooth the labyrinthic structure above described commences, and gradually increases in complexity.

In the genus *deirodon*,* the teeth of the ordinary bones of the mouth are so small as to be scarcely perceptible; and they appear to be soon lost, so that it has been described as edentulous, and has been called "anodon." An acquaintance with the habits and food of this species has shown how admirably this apparent defect is adapted to its well-being. Its business is to restrain the undue increase of the smaller birds by devouring their eggs. Now if the teeth had existed of the ordinary form and proportions in the maxillary and palatal regions, the egg would have been broken as soon as it was seized, and much of the nutritious contents would have escaped from the lipless mouth of the snake in the act of deglutition; but, owing to the almost edentulous state of the jaws, the egg glides along the expanded opening unbroken; and it is not until it has reached the gullet, and the closed mouth prevents any escape of the nutritious matter, that the egg becomes exposed to instruments adapted for its perforation. These instruments consist of the inferior spinous processes (hypapophyses) of the seven or eight posterior cervical vertebræ, the extremities of which are capped by a layer of hard cement, and penetrate the dorsal parietes of the œsophagus. They may be readily seen, even in very small subjects in the interior of that tube, in which their points are directed backwards. The shell being sawed open longitudinally by these vertebral teeth, the egg is crushed by the contractions of the gullet, and is carried to the stomach, where the shell is no doubt soon dissolved by the acid gastric juice.

In the *boa constrictor*, the teeth are slender, conical, suddenly bent backwards and inwards above their base of attachment; the crown is straight or very slightly curved, *e. g.* in the posterior teeth. The intermaxillary bone supports four small teeth; each maxillary bone has eight much larger ones, which gradually decrease in size as they are placed further

* The *coluber scaber* of Linnæus; an arboreal serpent of South Africa.

back. There are eight or nine teeth of similar size and proportions in each premandibular bone. These teeth are separated by wide intervals, from which other teeth, similar to those in place, have been detached. The base of each of the above teeth is extended transversely, compressed antero-posteriorly, and anchylosed to a shallow alveolus, extending obliquely across the shallower alveolar groove. An affinity to the lizard tribes is manifested by the greater development of the outer, as compared with the inner wall of the alveolar furrow.

The palatine teeth, of which there are three or four in each palatal bone, are as large as the superior maxillary, and are similarly attached. The pterygoid teeth, five or six in number, which complete the internal dental series on the roof of the mouth, are of smaller size, and gradually diminish as they recede backwards. In the interspaces of the fixed teeth in both these bones, the places of attachment of the shed teeth are always visible; so that the dental formula, if it included the vacated with the occupied sockets, would express a greater number of teeth than are ever in place and use at the same time. In the smaller species of boa, the intermaxillary bone is edentulous.

The *colubers*, like other true serpents, have two longitudinal rows of teeth on the roof of the mouth, extending along the palatines and pterygoids. The genus *oligodon* appears to form the sole exception to this rule. In the *dryinus nasutus*, a few small teeth are present on the ecto-pterygoid as well as on the pterygoid.

In certain genera of non-poisonous serpents, as *dryophis*, *dipsas* and *bucephalus*, in which the superior maxillary teeth increase in size towards the posterior part of the bone, the large terminal teeth of the series are traversed along their anterior and convex side by a longitudinal groove. In the *bucephalus capensis*, the two or three posterior maxillary teeth present this structure, and are much larger than the anterior teeth, or those of the palatine and premandibular series. They add materially, therefore, to the power of retaining the prey, and may conduct into the wounds which they inflict an acrid saliva; but they are not

in connection with the duct of an express poison-gland. The long-grooved fangs are either firmly fixed to the maxillary bones, or are slightly movable, according to their period of growth. They are concealed by a sheath of thick and soft gum, and their points are directed backwards. The sheath always contains loose recumbent grooved teeth, ready to succeed those in place.

In most of the *colubri*, each maxillary and premandibular bone includes from twenty to twenty-five teeth. They are less numerous in the genera *tortrix* and *homalopsis*, and are reduced to a still smaller number in the poisonous serpents, in the typical genera of which the short maxillary bone supports only a single perforated fang.

Poisonous Serpents.—The transitions to these serpents, which was begun in the bucephali and allied genera with grooved maxillary teeth, is completed by the poisonous serpents of the genera pelamis, hydrophis, elaps, bongarus, and hamadryas.

The superior maxillary bone diminishes in length with the decreasing number of teeth which it supports. The ecto-pterygoid bone elongates in the same ratio, so as to retain its position as an abutment against the shortened maxillary, and the muscles implanted into this external pterygoid bone communicate through it to the maxillary bone the hinge-like movements backwards and forwards upon the ginglymoid articulations connecting that bone with the prefrontal and palatine bones. As the fully developed poison-fangs are attached by the same firm basal anchylosis to maxillary sockets, which forms the characteristic mode of attachment of the simple or solid teeth, they necessarily follow all the movements of the superior maxillary bone. When the external pterygoid is retracted, the superior maxillary rotates backwards, and the poison-fang is concealed in the lax mucous gum, with its point turned backwards. When the muscles draw forward the external pterygoid, the superior maxillary bone is pushed forwards, and the recumbent fang withdrawn from its concealment and erected.

In this power of changing the direction of a large tooth, so

that it may not impede the passage of food through the mouth, we may perceive an analogy between the viper and the lophius; but in the fish, the movement is confined to the tooth alone, and is dependent on the mere physical property of the elastic medium of attachment; in the serpent, the tooth has no independent motion, but rotates with the jaw, whose movements are governed by muscular actions. In the fish, the great teeth are erect, except when pressed down by some extraneous force. In the serpent, the habitual position of the fang is the recumbent one, and its erection takes place only when the envenomed blow is to be struck.

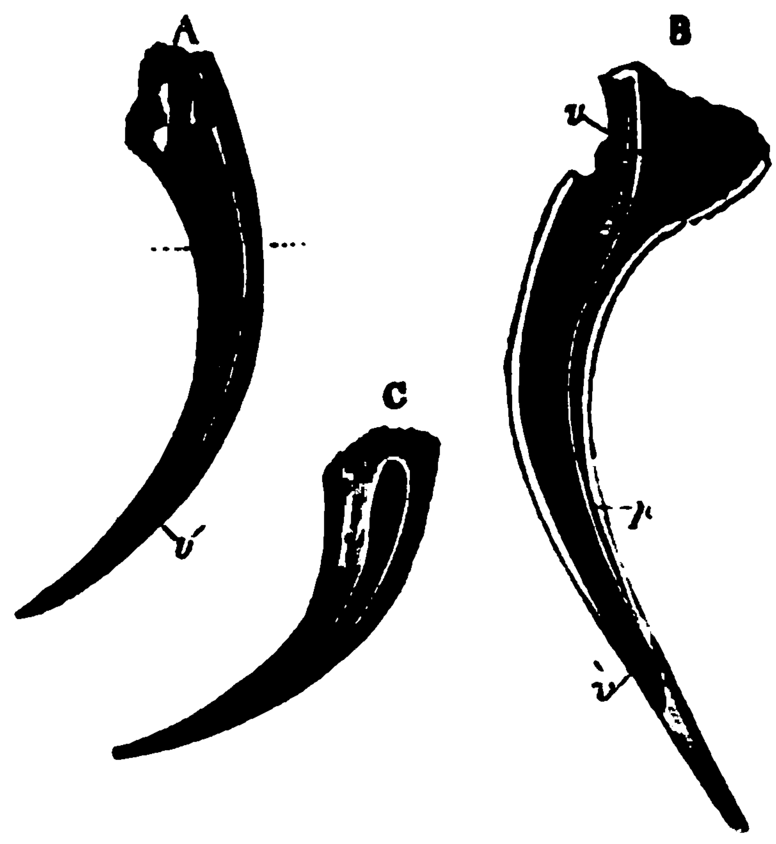
A true idea of the structure of a poison-fang will be formed by supposing the crown of a simple tooth, as that of a boa, to be pressed flat, and its edges to be then bent towards each other, and soldered together so as to form a hollow cylinder, or rather cone, open at both ends. The flattening of the fang, and its inflection around the poison-duct commences immediately above the base, and the suture of the inflected margins runs along the anterior and convex side of the recurved fang, as shown in fig. 24, *a*; the poison canal is thus in front of the pulp-cavity, as shown in the longitudinal section of the fang *b*. The basal aperture of the poison-canal *v*, is oblique, and its opposite outlet *v′*, is still more so, presenting the form of a narrow elliptical longitudinal fissure terminating at a short distance from the apex of the fang. The relative position of the two apertures of the poison-canal is shown in the figure of the fang of the large cobra in my "Odontography," vol. iv. p. 290, art. Reptilia, where a fine hair is represented as passing through the poison-canal.

The poison-glands occupy the sides of the posterior half of the head; each gland consists of a number of elongated narrow lobes, extending from the main duct, which runs along the lower border of the gland upwards, and slightly backwards; each lobe gives off lobules throughout its extent, thus presenting a pinnatifid structure; and each lobule is subdivided into smaller secerning cæca, which constitute the ultimate structure of the gland. The whole gland is surrounded by a double

aponeurotic capsule, of which the outermost and strongest layer is in connection with the muscles by whose contraction the several cæca and lobes of the gland are compressed and emptied of their secretion. This is then conveyed by the duct to the basal aperture of the poison-canal of the fang. We may suppose, that as the analogous lachrymal and salivary glands in other animals are most active during particular emotions, so the rage which stimulates the venom-snake to use its deadly weapon must be accompanied with an increased secretion and great distension of the poison-glands; and as the action of the compressing muscles is contemporaneous with the blow by which the serpent inflicts the wound, the poison is at the same moment injected with force into the wound from the apical outlet of the perforated fang.

The duct which conveys the poison, although it runs through the center of a great part of the tooth, is really on the outside of the tooth, the canal in which it is lodged and protected, being formed by a longitudinal inflection of the dentinal parietes

FIG. 24.



Poison-fangs of Serpents. (Magnified.)

of the pulp-cavity. This inflection commences a little beyond the base of the tooth, where its nature is readily appreciated,

as the poison-duct there rests in a slight groove or longitudinal indentation on the convex side of the fang; as it proceeds it sinks deeper into the substance of the tooth, and the sides of the groove meet and seem to coalesce, so that the trace of the inflected fold ceases, in some species, to be perceptible to the naked eye; and the fang appears, as it is commonly described, to be perforated by the duct of the poison-gland. In the hydrophis the groove remains permanently open, as in fig. 24, c.

From the real nature of the poison-canal it follows that the transverse section of the tooth varies in form in different parts of the tooth; at the base it is oblong, with a large pulp-cavity of a corresponding form, with an entering notch at the anterior surface; farther on the transverse section presents the form of a horse-shoe, and the pulp-cavity that of a crescent, the horns of which extend into the sides of the deep cavity of the poisoned-fang; a little beyond this part, the section of the tooth itself is crescentic, with the horns obtuse and in contact, so as to circumscribe the poison-canal; and along the whole of the

Fig. 25.

Section of poison-fang of Serpent. (Magnified.)

middle four-sixths of the tooth, the section, of which a magnified view is given in fig. 25, shows the dentine of the fang in-

closing the poison-canal, and having its own center or pulp-canal *p*, *p*, in the form of a crescentic fissure, situated close to the concave border of the inflected surface of the tooth. The pulp-cavity disappears, and the poison-canal again resumes the form of a groove near the apex of the fang, and terminates on the anterior surface in an elongated fissure.

The venom-fangs of the viper, rattle-snake, and the fer-de-lance are coated only with a thin layer of a sub-transparent and minutely cellular cement. The disposition of the dentinal tubes is obedient to the general law of verticality to the external surface of the tooth; it is represented as seen in the transverse section from the middle of the fang in fig. 25. Since the inflected surface of the tooth can be exposed to no other pressure than that of the turgescent duct with which it is in contact, the tubes which proceed to the surface *d*, while maintaining their normal relation of the right angle to it, are extremely short; and the layer of dentine separating the poison-tube from the pulp-cavity is proportionally thin. The calcigerous tubes that radiate from the opposite side of the pulp-cavity to the exposed surface *b* of the tooth are disproportionally long.

The teeth of ophidians are developed and completed in that part which forms the original seat of the tooth-germs in all animals; viz. the mucous membrane or gum covering, the alveolar border of the dentigerous bones. This germ presents the same lax tissue, and is as abundantly developed, as in the pike, lophius, and many other fishes; in which it likewise serves as the nidus and locality for the complete development of the teeth. The primitive dental papillæ in the common harmless snake very soon sinks into the substance of the gum, and becomes inclosed by a capsule. As soon as the deposition of the calcareous salts commences in the apex of the papilla the capsule covering that part becomes ossified and adherent to the dentine, and the tooth begins to pierce and emerge from the gum before its mould, the pulp, is half completed. Fresh layers of cells are successively added to the base of the pulp, and converted, by their confluence and calcification, into the tubu-

lar dentine, until the full size of the tooth is attained, when its situation in the gum is gradually changed, and its base becomes anchylosed to the shallow cavity of the alveolar surface of the bone.

In the posterior part of the large mucous sheath of the poison-fang, the successors of this tooth are always to be found in different stages of development; the pulp is at first a simple papilla, and when it has sunk into the gum the succeeding portion presents a depression along its inferior surface, as it lies horizontally, with the apex directed backwards; the capsule adheres to this inflected surface of the pulp; and the base of the groove of the loose, growing, poison-fang is brought into the same relation with the duct of the poison gland as the displaced fang, which has been severed from the duct.

Saurians.—The existing species of lizards differ from those of the crocodile in the anchylosed condition of the teeth, which present few modifications of importance; those that yield most fruit to physiology, and which have most expanded our ideas of the extent of the resources of nature, and the exceptional deviations from what was deemed the rule of structure in the saurian dentition, have been discovered by the study of the fossil teeth of extinct forms of the order. Amongst these the most extraordinary in respect of their dental system have been recently discovered in a formation in South Africa, which seems nearly as ancient as our own coal-seams. I have called them "dicynodonts"* from their detention being reduced to one long and large canine tooth on each side of the upper jaw. As these teeth give, at first sight, a character to the jaws like that which the long poison-fangs give, when erected, to the jaws of the rattle-snake, I shall briefly notice their characters before entering upon the description of the more normal saurian dentition.

Fig. 26, gives a reduced side view of the skull of the species of dicynodon called D. lacerticeps. The cranial cavity, (8, 8,) is extremely contracted, as in all the cold-blooded

* From δὶς, two, and κυνόδους, the name given by Hippocrates to the canine teeth, and signify the same idea as their common English denomination.

quadrupeds; it is bounded on each side by wide and deep temporal fossæ (*t*) indicating powerful muscles for the action

Fig. 26.

Skull of Dicynodon lacerticeps, one-third natural size.

of the lower jaw. The orbits (*o*) are large and round; the nostrils (*n*) are divided by the junction of the nasal bones (15) with the premaxillaries (22) as in lizards; there is not a single median external nostril, as in chelonian and crocodilian reptiles. The alveolar border of the lower jaw and of the premaxillary part of the upper jaw is trenchant, and seems to have been sheathed with horn.

The maxillary bone (21) is excavated by a wide and deep alveolus, with a circular area of half an inch, and lodges a long and strong, slightly curved, and sharp-pointed, canine tooth or tusk, which projects about two-thirds of its length from the open extremity of the socket. The direction of the tusks is forwards, downwards, and very slightly inwards; the two converging, as they descend along the outer side of the compressed symphysis of the lower jaw (*c*.) The tusk is principally composed of a body of compact unvascular dentine. The base is excavated by a wide conical pulp-cavity (*p*) with the apex extending to about one-half of the implanted part of the tusk, and a linear tract is continued along the center of the solid

part of the tusk. From this central line the dentinal tubes radiate, with a gentle curve at the beginning, convex towards the point of the tusk, and then proceeding straight to the periphery of the tooth, but inclining towards the apex. They present parallel secondary curves, divide dichotomously twice or thrice near their beginning and send off numerous small lateral branches chiefly from the side next the apex. At their primary curve the dentinal tubes are $\frac{1}{12000}$ of an inch in diameter, and their intervals are $\frac{1}{6000}$ of an inch across. The dental cells are most conspicuous near the periphery of the tooth, and vary in diameter from $\frac{3}{100}$ to $\frac{1}{1000}$ of an inch.

The enamel at least at the middle of the tusk, is thinner than in the teeth of the crocodile. It presents only a finely lamellated texture, the layers being parallel with the surface of the dentine on which it rests. There is only a fine linear trace of cement on the exterior of the sections of the implanted base of the tusks; and here it is too thin to allow of the development of the radiated cells in its substance. There is no trace of teeth or their sockets in the lower jaw (25, 23;) so much of the alveolar border as is exposed presents a smooth and even edge, which seems to have played like a scissor-blade upon the inner side of the corresponding edentulous border of the upper jaw; and it is most probable, from the analogies of similarly shaped jaws of existing reptilia, that the forepart of both the upper and under jaws, were sheathed with horn.

Until the discovery of the rhynchosaurus, this edentulous and horn-sheathed condition of the jaws was supposed to be peculiar to the chelonian order among reptiles; and it is not one of the least interesting features of the dicynodonts of the African sandstones, that they should repeat a chelonian character, hitherto peculiar, amongst lacertians, to the above-cited remarkable extinct edentulous genus of the new red sandstone of Shropshire: but our interest rises almost to astonishment, when in a saurian skull, we find, superadded to the horn-clad mandibles of the tortoise, a pair of tusks, borrowed as it were from the mammalian class, or rather foreshadowing a structure, which, in the actual creation, is peculiar to certain members of the highest organised warm-blooded animals.

In the other reptilia, recent or extinct, which most nearly approach the mammalia in the structure of their teeth, the difference and characteristic of the inferior and cold-blooded class is manifested in the shape, and in the system of shedding and succession, of the teeth : the base of the implanted teeth seldom becomes consolidated, never contracted to a point, as in the fangs of the simple teeth of mammalia, and at all periods of growth one or more germs of teeth are formed within or near the base of the tooth in use, prepared to succeed it, and progressing towards its displacement. The dental armature of the jaws is kept in serviceable order by uninterrupted change and succession ; but the matrix of the individual tooth is soon exhausted, and the life of the tooth itself may be said to be comparatively short.

The dicynodonts not only manifest the higher type of free implantation of the base of the tooth in a deep and complete socket, common to crocodilians, megalosaurs, and thecodonts, but make an additional and much more important step towards the mammalian type of dentition, by maintaining the serviceable state of the tusk by virtue of constant renovation of the substance of one and the same matrix, according to the principle manifested by the long-lived and ever-growing tusks of the walrus, and the scalpriform incisors of the rodentia.

The genera of the typical family of the squamate lacertians are arranged in two sub-families, the chief characteristics of which are derived from the dental system.

In the first group, the teeth are solid, or without any permanent internal cavity, and are very firmly anchylosed by their base to the alveolar groove upon the inner side of the jaw ; so that the extremity of the tooth is slightly directed outwards. The species which present this character are called pleodonts.

In the second group the teeth are excavated, or retain the pulp-cavity, and are less firmly fixed to the jaws, being applied vertically, like piles or buttresses, against the outer alveolar parapet, but not adhering by their base. The group is called cœlodonts.

The monitor lizard of South America is an example of the

pleodont group, in which the premaxillary teeth are ten in number. The maxillary teeth vary from ten to fifteen on each side, and increase in size as they are placed farther back; the hindmost teeth are tricuspid in young individuals, and present the form of simple tubercles in the old monitors. The mandibular teeth, fifteen to eighteen in number in each ramus, correspond in size and form with those above. In the cœlodont group, the "swift lizards," (tachydromus,) have the pterygoid bones armed with minute teeth. The teeth on both upper and lower jaws are of larger size, and the hinder ones are tricuspid. The true lizards, (lacerta,) have two kinds of teeth quoad form; the anterior small, conical, aud recurved; the posterior larger, and bi-or tri-cuspid. Some species have also pterygoid teeth; as the common lacerta agilis.

In the gigantic fossil monitor of Maestricht, the teeth combine the pleodont with the acrodont characters.

The true affinities of the mosasaur, which was at least twenty-four feet in length, and the remains of which characterise the chalk-formations, were first determined by Cuvier, who places it in the lacertian group of saurians, between the iguanæ and monitors. Its dentition exhibits in an eminent degree the acrodont character; the teeth being supported on expanded conical bases anchylosed to the summit of the alveolar ridge of the jaw: no existing saurian exactly parallels this mode of attachment of the teeth, either in regard to the breadth of the alveolar border, or in the relative size of the osseous cones to the teeth which they support. A shallow socket is left where the tooth and its supporting base are shed. The form of the teeth is likewise different from that hitherto observed in any existing saurian: the crown is pyramidal, with the outer side nearly plane, or slightly convex, and separated by two sharp ridges from the remaining surface, which forms a half-cone. All the teeth are slightly recurved, and their peripheral surface is smooth. The teeth are implanted upon the premaxillary, maxillary, and premandibulary bones; a series of similarly shaped but much smaller teeth are placed upon the pterygoid bones.

The gradual transition from the simple structure of the compact dentine to the osteo-dentine of the anchylosed base of the tooth was not known to Cuvier; otherwise he could not have supposed that the crown and the base of the tooth of the mosasaurus were formed by vital processes of so dissimilar a nature as to forbid him considering them as parts of one and the same body. Cuvier had originally described the expanded base of the tooth of the mosasaur as the root of the tooth; but afterwards observing that the corresponding base became anchylosed by ossification of the remains of the pulp to the jaw, he conceived it to be incorrect to regard it as a part of a body which he believed to be an inorganic product, and the result of excretion.

"The tooth," he observes, in correcting his first account of the mosasaurus, "has no true root, but it adheres strongly to that pulp which has secreted it, and it is further held in connection with it by the remains of the capsule which has furnished the enamel, and which, by becoming ossified also, and uniting itself to the maxillary bone and the ossified pulp, implants or rivets the tooth with additional force."

The necessity under which Cuvier felt himself compelled to regard the crown and the base of the tooth of the mosasaur as two distinct parts, is at once banished by the recognition of the principle, that the processes of calcifiication are essentially the same at every part of a tooth, whether it be free or anchylosed; and that they are modified only as I have shown in my memoir on the formation of the teeth of the shark, according to the density of the part to be produced.

Scincoid Lizards.—Most of these smooth-scaled lizards have small mouths and slender sharp teeth, fitted best for insect food; they are usually confined to the upper and lower jaws; but the medicinal scink of ancient pharmacy (scincus officinalis) has four or five small obtuse teeth upon each pterygoid bone. The chief exception to the typical dentition of the present family is made by the large scincoid lizards of Australia, which, on that account, have received the generic name of *cyclodus.*

The dentition of the *cycl. nigroluteus* is exemplified in the lower jaw, fig. 27. In the upper jaw, the single premaxillary

Fig. 27.

Lower jaw and teeth of Cyclodus Nigroluteus.

bone has depressions for twelve teeth, of which only the alternate ones, are usually in place; they are of very small size, with the fang compressed laterally, and the crown antero-posteriorly, so as to resemble a true incisor in form, the summit sloping to an edge from behind forwards, with the middle of the cutting surface a little produced. Each superior maxillary bone has depressions for fourteen teeth; they quickly increase in size, and exchange their conical for a sub-hemispherical crown, the eighth to the thirteenth inclusive are the largest teeth; they are set obliquely, and pretty close together. In the lower jaw there are two small incisors, at the anterior part of each premandibular bone correspoding with those of the premaxillary; these are succeeded by five or six conical teeth, and the rest correspond in size and form with the tuberculate molars of the upper jaw.

All the teeth are attached, after the pleurodont type, by their base and outer margin to shallow depressions on the outer side of the external alveolar parapet.

The germs of the successional teeth, *c.* fig. 27, are developed at the inner side of the base of their predecessors, *a*, which they excavate, undermine, and displace in the usual manner.

Iguanas.—Certain genera of this family of lizards, e. g. *istiurus*, *lophyrus*, *colotes*, and *otocryptis*, have the teeth soldered, like those of *mosasaurus*, to the summit of the alveolar ridge, and thence are called "acrodonts:" in all these lizards the maxillary and mandibular teeth may be divided into anterior laniary, and posterior molary teeth. In most of the iguanians the teeth are lodged in a common shallow oblique alveolar

groove, and are soldered to excavations on the inner surface of the outer wall of the groove: these are called pleurodonts. Most of them possess pterygoid as well as maxillary teeth: but the following genera, *hyperanodon*, *tropidolepis*, *phrynosoma*, and *callisaurus*, are exceptions.

In the pleurodont iguanians, the teeth never present the true laniary form; and if simply conical, as at the extremes of the maxillary series, the cone is more or less obtuse; but, in general it is expanded, more or less trilobate, or dentated along the margin of the crown.

The *amblyrhynchus*, a genus which is somewhat remarkable for the marine habits of at least one of the species (amblyrhynchus ater,) whose diet is sea-weed,* has the tricuspid structure well developed in the posterior teeth.

The typical genus of the present family of saurians (iguana tuberculata,) is characterised by the crenate or dentated margin of the crown of the maxillary and premandibular teeth, a few of the anterior small ones excepted. The pterygoid teeth are arranged in two or three irregular rows, resembling somewhat the "dents en cordes" of fishes. In the full grown *iguana tuberculata*, there are from forty-seven to forty-nine teeth in both upper and lower jaws. The number is less in young subjects. The double row of pterygoid teeth are in close order on each side.

In the horned iguana (metopoceros cornutus,) there are about fifty-six teeth in the upper and lower jaws, of which the four first are conical and slightly curved. The twelve succeeding teeth are somewhat larger in size, with more compressed and expanded crowns; the rest are triangular, compressed, with dentated margins. The inner surface of the crown of the tooth is simply convex and smooth; the outer surface traversed by a median longitudinal, broad, obtuse ridge. There is a single row of small teeth implanted in each pterygoid bone. No iguanian lizard has teeth on the palatine bones.

* This species, and probably all the known *amblyrhynchi*, or blunt-nosed iguanæ, inhabit the islands in the Galopagos group; their habits have been well elucidated by Mr. Darwin. (Voyage of the Beagle, vol. iii, p. 466.) In specimens which he dissected, he found the stomach loaded with minced sea-weed.

The teeth of the *iguanodon*, though resembling those of the iguana, do not present an exact magnified image of them, but differ in the greater relative thickness of the crown, its more complicated external surface, and, still more essentially, in a modification of the internal structure, by which the *iguanodon* equally deviates from every other known reptile.

As in the iguana, the base of the tooth is elongated, contracted, and subcylindrical; the crown expanded, and smoothly convex on the inner side. When first formed, it is acuminated, compressed, its sloping sines serrated, and its external surface traversed by a median longitudinal ridge, and coated by a layer of enamel, but, beyond this point, the description of the tooth of the iguanodon indicates characters peculiar to that genus. In most of the teeth that have hitherto been found, three longitudinal ridges (fig. 28) traverse the outer surface of the crown, one on each side of the median primitive ridge; these are separated from each other, and from the serrated margins of the crown, by four wide and smooth longitudinal grooves. The relative width of these grooves varies in different teeth; sometimes a fourth small longitudinal ridge is developed on the outer side of the crown. The marginal serrations, which at sight, appear to be simple notches, as in the iguana, present, under a low magnifying power, the form of transverse ridges, themselves notched, so as to resemble the mammilated margins of the unworn plates of the elephant's grinder: slight grooves lead from the interspaces of these notches upon the sides of the marginal ridges. These ridges or dentations, do not extend beyond the expanded part of the crown; the longitudinal ridges are continued further down, especially the median ones, which do not subside till the fang of the tooth begins to assume its subcylindrical form. The tooth at first increases both in breadth and thickness; it then diminishes in breadth, but its thickness goes on increasing; in the larger and fully formed teeth, the fang decreases in every diameter, and sometimes tapers almost to a

Fig. 28.

Unworn teeth of Iguanodon.

point. The smooth unbroken surface of such fangs indicates that they did not adhere to the inner side of the maxillæ, as in the iguana, but were placed in separate alveoli, as in the crocodile and megalosaur; such support would appear, indeed, to be indispensable to teeth so worn by mastication as those of the iguanodon. A fracture of this tooth shows that the pulp was not entirely solidified, but that its cavity had continued open at the thickest part of the tooth.

(To be Continued.)

ARTICLE VIII.

Queen's Hospital, Birmingham. Reported by W. J. MOORE, ESQ., House-Surgeon.

Dislocation and Fracture of the Lower Jaw.—When the lower jaw is fractured, it is often a matter of some difficulty to keep the broken parts in apposition, on account of the strength of the muscles attached, and the strain caused on the parts by their spasmodic action. When the accident occurs to a child, the difficulty is ten-fold increased; and it is more than probable in such a case, that union without deformity will not occur; also, when there is dislocation as well as fracture it renders the case an awkward complication. Of course, the more approved method is that of fastening the teeth together, which, with the help of suitable bandages, generally succeeds; but it occasionally happens that this plan will not do, and that the posterior portion is pulled towards the centre of the mouth in spite of all; then, in such a case, a piece of wood passing transversely across the mouth and propping the teeth has proved of great service.

Among other cases, the following have been treated at this hospital.

Edward Cregoe, aged 14, was admitted, under the care of Mr. Sands Cox, on the 15th of October, having received a kick

from a horse on the side of the head and face. There were present, pale features, feeble pulse, and other symptoms of partial collapse. He was, however, sensible, and could readily answer questions. The mouth was found open, the chin slightly protruding and somewhat turned to the right side; there was also much swelling about the zygoma and articulation of that side. As it was evident a dislocation existed, pressure with the thumbs was had recourse to; and, after some manipulation, the jaw appeared returned to its proper position. There was, however, no noise heard during the reduction, but he evidently could move it in a greater degree. After the application of suitable bandages, he was put to bed where he remained some hours before he quite recovered from the collapse consequent on the accident.

The next day the swelling of the side of the face was much increased; but, on examination, Mr. Sands Cox detected crepitus near the upper portion of the perpendicular ramus. This fact, however, required no modification in the treatment, and the boy went on favorably, the only medicines requisite being a dose or two of calomel during the stage of reaction.

He ultimately left the hospital on October 24, feeling his jaw nearly well; and in the course of another week, again presented himself, able to bite the hardest crust with ease.

The features of interest in this case are—1st. That the fracture occurred in the perpendicular portion of the bone, the horizontal ramus being by far the most frequent seat. 2nd. The occurrence of dislocation of one condyle only, dislocation of both being generally present; and 3rd. The occurrence of dislocation in conjunction with fracture. Here, however, no modification of treatment was necessary; but, had the fracture occurred in some other portion of the bone, the treatment would probably have been attended with more difficulty.

Compound Fracture of the Lower Jaw.—Patrick Welsh, aged 40, admitted June 24th, under the care of Mr. Knowles. He had half an hour before received a kick on the lower jaw, which caused a fracture, oblique in direction of the horizontal ramus of the left side. The mucous membrane was lacerated

much, and one of the teeth lost, while the broken parts were more than half an inch separate. There was also a good deal of bleeding. This having been stopped, the parts were brought into apposition, and with much difficulty kept in place by means of thin strong wire passing round the adjacent teeth, aided by a piece of wood passing across the mouth, from the first molar on the right side to the first tooth of the fractured portion on the left, thus propping the parts in position. A gutta percha support was also adjusted beneath the jaw, and a four-tailed bandage used. He went on well, requiring only a dose of opening medicine. There was swelling beneath the tongue for a few days, but that decreasing, he was eventually made an out-patient, on July 12th, stating that he could eat meat and crust with facility. The support, however, was not taken away for some days afterwards.

In treating such cases, some dexterity is required in the adjustment of the wire, lest, by pressure, ulceration of the gums take place. It is well to use two or three rounds of wire, passing them, not only between the two teeth next to the fractured portion, but also between the second and third from that part, in order that the stress should not all rest on one tooth, and that tooth often shaken in its socket by the violence which produces the fracture. It is also worthy of notice in how short a space of time, fractures of the jaw will become firm, which evidently depends on the vascularity of the part.

Compound Fracture of Lower Jaw in a Child.—Bridget Varney, admitted August 3, under the care of Mr. Knowles. A short time previously she had been run over, and there was a large scalp wound extending over the right parietal bone, and a fracture oblique in direction of the right horizontal ramus of the lower jaw. There was also extensive laceration of the soft parts, and the fractured portions were some distance apart. One tooth, the last molar, was deficient, and the fracture extended from its site obliquely backwards towards the angle of the jaw. Under these circumstances, no retentive means could be employed within the cavity of the mouth; and, indeed, had this been possible, the crying and struggling of the child would

have rendered it a matter of no little difficulty. External means were therefore had recourse to, and a very strong piece of gutta percha applied, which, with a bandage, kept the parts somewhat in apposition. Still, however, they could not be accurately adjusted; that is to say, they would not remain so. The child, however, speedily recovered, and now has but little deformity, and that little evidently disappearing as she grows older. The scalp wound was some time healing after the jaw was quite strong.—*Med. Times.*

ARTICLE IX.

Salivary Fistula.

Mr. Lynch relates the following case in the Medical Times. Anne Jane Bushell, aged five years, was brought to me for an abscess in her cheek. She had a fall on a fender about a month previously. Shortly afterwards a tumor formed, which burst, and continued to discharge a thin purulent liquid. From the nature of the discharge, and the situation of the wound, I suspected an injury of Stenon's duct, and was confirmed in this opinion by laying her on the opposite side, and noticing the cavity of the wound, after being sponged out, to fill with salivary fluid. Having consulted with Mr. Chalmers, of Everton, we adopted the following mode of procedure: I introduced a small hydrocele trocar and canula through the wound, from without inwards, and, having got it into the mouth, withdrew the trocar, leaving the canula, having previously formed a piece of gutta percha to fit the canula, about two inches long, with a head to it, somewhat resembling a twopenny tack with the point cut off. Through the shoulder of the apparatus, I passed some ligature silk, and, by means of an eye probe, I passed the silk through the canula, and then withdrew the latter, securing the threads with some strips of adhesive plaster to the cheek beyond the abscess, thus forming an efficient seton; the head on the interior of the cheek ena-

bling me to fix it firmly. After the seton had remained in the cheek about five weeks, I was obliged to withdraw it, owing to its causing great swelling and inflammation of the side of the face, which speedily disappeared, and the saliva for some days passed entirely into the mouth; but in about a week after the withdrawal of the seton, it again collected, and burst externally. I now commenced to pass a small probe from the mouth in the track of the seton daily, and was obliged to continue to do so for nearly three months, before I could confidently expect a perfect cure. If a day or two was omitted, symptoms of a fresh filling of the old cyst were sure to present themselves. However, after persevering for the aforementioned length of time, I was gratified in effectually curing the fistula, as some two months have now elapsed since the last passing of a probe, and no return of the complaint has appeared. I may add, that the treatment of this seemingly trifling affection required almost daily attention for nearly five months.

ARTICLE X.

Epulis.

THE maxillæ are not exempt from extraneous growths, but they are rarely the seat of malignant tumors. Epulis, *epi oulon*, an hypertrophy of the gum, is the accidental formation to which the jaw is most liable. The tumor displaces the teeth between which it commences, or involves by its extension two or three of the contiguous teeth. The growth at first is indolent and devoid of pain, and increases very slowly. While small it is not liable to hemorrhage, and gives no inconvenience but from its untoward position; but its increase is not limited, and it may attain an enormous size. When long standing and of great extent, it may become the seat of noisome ulceration or of malignant disease. Its thorough extirpation should not be delayed.

A rare example of this tumor occurred in the case of a colored woman, otherwise of sound health and free from constitutional or hereditary disease. It was situated upon the symphysis of the lower jaw, and at the time of removal had attained a size somewhat exceeding a walnut. The pedicle of attachment was smaller than the tumor, and its substance overspread several of the adjoining teeth. It was deemed prudent in its excision not only to denude the bone, but to remove a portion of the alveolar process. To accomplish this neatly and expeditiously, a pair of bone forceps of a peculiar form were designed, having the cutting part so constructed as to operate in a horizontal direction, making the plane of the incision at right angles with the shaft of the instrument. The removal of a tooth at each extremity of the tumor was followed by two vertical incisions, and the entire growth was removed with but little loss of blood. On inspection, the apodosis justified the protasis. The substance of the excrescence was of a dark pink color and fibrous texture, arranged, unlike scirrhus, in curvelinear lamellæ, similar to the coagula of aneurism. It probably contained a large proportion of albumen highly charged with water, shown by its shrinking and corrugation on immersion in alcohol. A cursory examination detected none of the granular matter of cancer, and the arrangement of the stromal layers classified it among the simple non-malignant sarcomatous, or fibrous tumors. Considerable time has elapsed, with no return of the formation, and no production of the disease in another shape; these circumstances, with the absence of any constitutional contaminated diathesis, and its exceeding slow increase, make it quite certain that the growth was of the homologous kind—the counterpart of healthy and natural textures.

Transcendental anatomy alone can afford anything approaching an exclamation for the departure from established morphological laws, and the usual structure and constituency of normal accretions. To call an adventitious growth a lesion of nutrition, or perverted nutrition, approaches in no degree the primal cause.

A circumstance worthy of remark in this case, was the un-

usually irritating effect of the vapor of ether upon the respiratory apparatus. The reflex influence of the par vagum, by means of its pulmonary plexus, upon the laryngeal branches, produced spasmodic contraction of the glottis to such an extent as to suspend respiration and frustrate anæsthetic inhalation. Sometimes failure arises from too sparing administration of ether. A more liberal application will overcome the disagreeable symptoms, and tranquilize the suffocative spasms. Imperfect etherization produced the usual fantastic effects of partial intoxication rapidly induced. The motor centers, released from the control of reason, uttered unconscionable and antagonistic mandates, which the members found difficult to execute and accomplish; and these bizarre impulses threw the fleshy tabernacle into singular and notable contortions. While the cerebrum "all as frantic, which some believe the soul's frail dwelling-place, did, by the idle comments that it made," indicate, in prating lunacy, some most curious traits of the African race and blood. E. Sanford.

Boston Med. & Surgical Jour.

ARTICLE XI.

Spontaneous Collapse of the Walls of the Antrum.

A paper by White Cooper was read, (and illustrated by a portrait and cast,) of a case of collapse of the antrum. The patient was a respectable young Irish woman, of healthy constitution, and strong frame, who, nine years ago, perceived a dusky mark beneath the left eye; after a time this extended down by the side of the nose, and was followed by a sinking of the cheek in that situation; there was, however, neither pain nor uneasiness. After this had existed nearly seven years, gradually increasing in extent, she applied to Mr. Cooper on account of the tear flowing over the cheek. Palliative measures were adopted, and this unpleasant symptom subsided. This

was early in 1849, and since that time the sinking of the anterior wall of the antrum has steadily continued to increase, and has now given rise to considerable deformity, the appearance closely resembling that which would have arisen had a large portion of the superior maxillary bone been removed, and the integument sunk. The teeth on the affected side were in a most unhealthy state, and two were removed in 1849, by Mr. Alfred Canton, in the hope that the morbid action might be arrested; but such has not been the case. Mr. Cooper has not been able to find a similar case related in any work.

After the reading of the case, various opinions in respect to its nature were offered. There was no syphilitic taint, and no external injury. It was conjectured that the deformity might be natural, that it was not very uncommon for the left side of the face to be smaller than the right; that it might have arisen from mollities ossium; that the antrum might have fallen in, from the contraction consequent upon the spontaneous cure of a disease in that cavity, by which the anterior wall was dragged inwards; that it might have arisen from falling in of the anterior wall from obstruction of the opening of the antrum into the nasal duct, and consequent atmospheric pressure. None of these solutions, however, were regarded by the author as conclusive or satisfactory.—*London Lancet.*

ARTICLE XII.

On Anchylosis of the Lower Jaw. By Dr. Wernher.

S. R——, æt. twenty-three, when three years of age underwent severe salivation, after which the jaw remained in a fixed state. Notwithstanding the absence of masticatory power, he was well nourished. The jaw was quite immovable, firm pressure or traction exerting no effect upon the position of the teeth. The incisors and molars were indeed, for the most part,

wanting, the roots of such as did exist, projecting beyond the alveoli of the diminutive jaw-bone. The jaws were so far separated, that with some trouble, the little finger could be introduced in front; but from the anterior molars on each side backwards, bony arches connected the upper and lower jaws. The buccal mucous membrane was attached to the gums at the anterior edges of these arches, but the temporal and masseter muscles remained free. Speech much resembled that which takes place with the mouth closed; and food which did not require mastication was introduced between the defective teeth. To remedy this state of things, the gums were separated by an incision from the cheeks and lips, and a broad portion of the connecting arch on either side removed by a small saw. The jaws could now be expanded, by aid of a mouth speculum, to the extent of half an inch, some painful stretching of the muscles being induced. The patient was enabled, too, to voluntarily close the mouth again, proving that twenty years of inactivity had not destroyed the functions of the joints and muscles. After several weeks perseverance in gradual dilatation, a still wider expansion was obtained, enabling the patient to chew food that was not too hard, which, indeed, the loose state of his teeth also prevented him biting.

Anchylosis of the lower jaw may occur in three localities. 1st. The head of the condyle may become fixed in its glenoid cavity. This is the most frequent form, examples of which are recorded by Sandifort, Blandin, Cruveilhier, Howship, Holscher, Hyrtl, &c. 2d. The coronoid process may become attached to the zygomatic arch. Of this, but two observations are recorded, one by Sandifort (Museum. Anat. vol. iv,) and by Sebastian in his "Essay on Anchylosis," published at Groningen, 1826. 3d. The alveolar processes may become conjoined. Of this, there are three examples on record, besides the one now narrated, which are to be found related in Walther's "Museum Anat." in "Rust's Magazin," Band 1, and in Bonnet's (cited from Kunholz) "Maladies des Articulations."

Am. Journal of Med. Sciences.

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The Half-Yearly Abstract of the Medical Sciences. Edited by G. W. H. Rankin, M. D. Philadelphia: Lindsay & Blakiston. No. 14, July to December, 1851.

Of the making of books, there is no end, and of the reading of them all, even of the good ones, there is no possibility. To the medical practitioner especially, the effort to keep up with the press is utterly hopeless. Hence, such publications as the excellent one before us are most necessary and benevolent devices. We recommend Rankin's Abstract to all who do not take it. It will furnish all the best papers from all the best journals. Each number contains 296 pages, and is furnished to distant subscribers, free of postage, at the very low price of two dollars per annum, and it is worth *double the amount.*

Meigs' Velpeau's Midwifery. Fourth American, with the additions from the last French edition by W. Byrd Page, M. D. &c., pp. 652. Philadelphia: Lindsay & Blakiston, 1852.

To commend Velpeau's Midwifery, would be to "gild refined gold or paint the lily." Its character has long since been established as a standard book on obstetrics. Dr. Meigs' translation has also gone through four editions, a sufficient evidence of its acceptability.

The engravings in this edition are numerous and well executed, and will much facilitate the acquirement of correct information. The lines have fallen to the modern student on pleasant places. It is easy now to master the mysteries which once so tried the patience and perseverance of us elders, when in our younger days we pored over the solid pages, unbroken by a cut, and tried in vain to form images in our minds of the things described.

We can honestly recommend this book. Midwifery should be understood thoroughly by every man who undertakes to practice it, and to understand it thoroughly, it is necessary to read Velpeau.

The Medical Student's Vade Mecum. By George Mendenhall, M. D. Third edition, with two hundred and twenty-four engravings. Philadelphia: Lindsay & Blakiston, 1852, pp. 690.

This excellent epitome is very naturally popular among students. It furnishes a compend of medical science in the form of questions and answers, and cannot but be advantageous to those who use it. Young practitioners may also find it very useful. Like all of Lindsay & Blakiston's books, it is well printed, and the cuts are good. These publishers evidently spare no expense to furnish a good article, and the works from their press should be proportionably encouraged.

Discourses delivered before the Cincinnati Medical Library Association. By Daniel Drake, M. D., 1852.

Dr. Drake is well known to the medical profession as an industrious, liberal minded, and intellectual man, who has for many years devoted himself with enthusiastic assiduity to the advancement of medicine. Though these discourses have a special local interest, they will be read with pleasure by all who are interested in medicine and medical men.

Review of Materia Medica for the use of Students. By John Biddle, M. D., &c. &c. With illustrations. Philadelphia: Lindsay & Blakiston, 1852, pp. 320.

A very convenient and good book for students and physicians. Dr. Biddle is an excellent writer, and has richly earned, and will receive the thanks of his medical brethren for the valuable work which he has presented to the profession.

The Pocket Formulary. By Henry Beasley. First American from the last London edition; corrected, revised and enlarged. Philadelphia: Lindsay & Blakiston, 1852, pp. 443.

A good book for reference, but too big for the pocket. In truth, however, no body carries a formulary in his pocket. Some American might probably carry one in his *hat*, if made of a proper shape. It is strange, that publishers have not provided books for this national receptacle of portables. The book will be useful on the table, however, as other dictionaries are. It will also be acceptable to apothecaries.

Ten Minutes Advice respecting the Human Teeth. By Horace Norton, M. D. Watertown, Wisconsin: Milwaukee, 1851.

A book from Wisconsin! The wonder of the grateful man who had unexpectedly got a dinner from a miser, broke out in a poetical ejaculation,

"In the midst of famine, we have found relief,
And seen the wonder of a chine of beef!"

Very similar was our wonder to see a book from the wilderness. But it seems that it is a wilderness no longer. A man need not sleep like Rip Van Winkle, to get behind his age. He need only sleep for a single night, to find his notions wrong. A book from Wisconsin! and not a book of travels nor a description of wild cats, but about the teeth! We wish to see nature in her freshness before we die, but we must hasten or there will be no nature left to see.

The little book before us contains much excellent advice, and has less the appearance of an advertisement than most similar publications. We thank the author for the copy he has sent us.

The Importance of Preserving the Teeth. By John Linn, *Dentist.* Portsmouth, Va.

This is a little popular treatise, and will, we have no doubt, do good. It is a question of ethics, however, how nearly such publications approach advertisements. Dentists should be on their guard in this matter. It is well to give the people information, and in one sense all medical books may be considered advertisements. The dividing line here is as sharp as a razor's edge. He must walk cautiously, who will venture on it.

EDITORIAL DEPARTMENT.

Annual Commencement of the Baltimore College of Dental Surgery.—The exercises of the last Commencement were held in the hall of the college on the evening of March 18th, 1852, in the presence of a large audience of ladies and gentlemen, and the examining committee. This committee, it may be necessary to state, is composed of three medical gentlemen and four dentists, who have been appointed from year to year, since the first

recommendation of the American Medical Association. They take part in the examinations, and no degree is conferred without their approbation.

The exercises were opened by prayer, by the Rev. B. H. Nadal. The following candidates were then called up by the dean, Professor W. R. Handy, and the degrees conferred by Prof. C. A. Harris.

Graduates of Session 1851--'2.

	Residence.	Thesis.
Thos. D. Siminton,	Pa.,	Civilized and Uncivilized Man.
Aldabert J. Volck,	Germany,	Dental Apparatus of the Nerves.
George Mears,	Pa.,	Preservation of the Teeth.
P. Henry McCargo,	Va.,	Caries of the Teeth.
Stanhope A. Sudderth,	N. C.,	Caries of the Teeth.
Warren Welch,	Md.,	Dental Caries.
Horace E. Chapin,	Mass.,	Mechanical Dentistry.
Francis E. Clautier,	La.,	Caries of the Teeth.
Richard H. Finch,	Va.	Anasthesia.
Henry F. Stevens,	Conn.	Deciduous Teeth.
John A. Cobbs,	Va.	Diseases of the Maxillary Sinus.
Albert A. Cleaveland,	Mass.	Dyspepsia.

Dr. Eleazar Parmly of New York, the provost of the college, now arose and addressed the graduates and audience on the subject of dental education, a report of which will be found in another part of the present number of the Journal. We ask for it the perusal of our readers. The Doctor takes a plain, common sense practical view of the subject.

Professor Robert Arthur, of Washington city, the orator of the occasion, pronounced the *valedictory*. This contains most excellent advise to the graduating class, warning them of the difficulties in their path, and encouraging them to perseverance, and with unflinching firmness to remain true to themselves, true to their professional brethren, and true to their patients, as the safest, surest, and most lasting way to secure the approbation of their own consciences, pecuniary reward, and the approbation of their fellow men. But we find it impossible to give even an outline of this excellent address, and we would be glad to see it published, not only for the gratification of the graduates, for whom it was especially designed, but also for the profession generally.

The exercises were interspersed with appropriate music at proper intervals. At the conclusion, the audience was dismissed with a benediction from the Rev. B. H. Nadal.

Dr. Trenor and Dental Colleges.—Our readers may have expected from us some review of Dr. Trenor's essay upon dental education, and his philippic against dental colleges. But we feel no disposition to give more attention to it than a bare notice. If Dr. Trenor's article proves any thing,

it demonstrates the necessity of dental colleges, both argumentatively in what he says, and illustratively in the manner in which he says it. If the colleges can be overturned by such an onset as his, they must be feeble structures, and if the professors could be annoyed by his detraction they must be more sensitive than wise. Men sometimes in their ungovernable animosity, strike so hard as to blunt their own weapons, and benumb their own hands.

We would be sorry to do any thing to prevent Dr. Trenor's promotion. We think it will do him good and no body else any harm. He will never understand himself nor his scheme until he has tried to carry his views into practice. Disappointment may reach, where warning cannot, and mortification accomplish what argument has labored in vain to perform. For the present, Prejudice, the deaf man, sits at ear gate. Vanity seems to have been tickled into hysterics, and judgment granted a holy-day. After a while things will be better. "Anger is a *brief* madness," and self-conceit soon exhausts its swim bladder.

Allen's Silicious Cement.—We have received from Professor Allen, of Cincinnati, Ohio, a set of artificial teeth, designed for the upper jaw, mounted very beautifully on a platina base; to which, in the interdental spaces, and on the buccal and palatine surfaces of the teeth, a siliceous composition is fused, giving to the piece a very finely finished appearance. The teeth were first attached to the plate in the usual way, and the silicious composition afterwards applied and fused in a furnace. The teeth being sustained by backings soldered to the plate, their liability to be broken from the base is, certainly, very greatly diminished, and when mounted in this manner, they unquestionably possess, on some accounts, advantages over those put up in the ordinary way. The complete exclusion of the secretions of the mouth from between the teeth and plate, by the intimate union of the two, must prevent the contamination of the breath which so frequently arises from the use of artificial teeth, and especially when the most constant attention is not paid to their cleanliness.

But notwithstanding these apparent advantages, it is supposed by many, that the springing of the plate during mastication, will crack the cement, and, in a short time, cause it to scale off, but the result of the experiments which have been made with it thus far, so far as it has come to our knowledge, would seem to prove this opinion to be incorrect. But this is a point which time will soon settle, and until then, it is useless to speculate upon the subject. Admitting this supposition to be groundless, as we sincerely hope it will prove to be, the introduction of this method of mounting artificial teeth in the United States, will prove a new epoch in mechanical dentistry in this country, which may be truly said to have *progressed*, during the last twenty-years, *a pas de geant.* We cannot, how-

ever, but regard the use of platina as a base for artificial teeth as objectionable, the weight of it being about double that of gold.

A New Base for Artificial Teeth.—Mr. John Spence, surgeon dentist of Edinburgh, Scotland, gives in a letter to the senior editor, the following description of a set of under teeth which he made in the summer of 1851, for a gentleman, "who, owing to the great absorption of the alveoli, required an unusual depth of socket, and whose gums were very easily irritated. He has been," says Mr. S., "my patient for many years, and I have tried him with mineral teeth set on gold, and also in hippopotamus tusk—the former was too irritating to the gums, the latter soon became decomposed and offensive from the vitiated state of his saliva, and required to be renewed every twelve or eighteen months. Under these circumstances, I proposed making the base of marble, with ten mineral teeth set into it; this, he gladly agreed to try, and having used them since July, he declares they are the most pleasant and most efficient he has ever yet had.

"I have since made another set, which is also giving equal satisfaction, but it has been about half the time in use. I may mention that both patients have upper sets on gold, with spiral springs attached to the under marble pieces.

"After trying several kinds, the marble I found best is the *Gristola de Carara*; it is hard without being brittle, and takes a high polish. The teeth I stained a little yellowish, and the gum a pale pink, but I fear the acid of the saliva, particularly of the first patient, will soon eat it out, and I question, if in time, it will not even eat into the marble itself."

The advantages derived in these cases from the use of marble, might be obtained by cast block tin bases, prepared in the manner as described by Dr. E. G. Hawes, of New York, in a former number of the Journal, which is not like marble, liable to be broke by a fall. There are many cases where weight and thickness of base are very desirable, if not absolutely necessary for artificial teeth for the lower law.

Hunter's Silicious Cement.—In a former number of the Journal, we took occasion to notice some specimens of artificial teeth sent to us for inspection by Dr. Hunter, of Cincinnati, Ohio, mounted on gold plates with a beautiful artificial gum formed of a silicious composition fused to the teeth and plates. Since then, a gentleman from the west, wearing a double set of artificial teeth mounted by Dr. H. in the same manner, called upon us, that we might have an opportunity of seeing them in the mouth. The teeth were mounted on gold plates, accurately adapted to the parts on which they rested, and were worn with great comfort and satisfaction, answering all the purposes which a substitute for the natural organs is capable of subserving.

Fees for Dental Operations Reduced.—The use of unprofessional means to obtain practice is bad enough in an ignoramus, but when we see a man whose opportunities for obtaining information have been ample, descending to the trickery of charlatanism to secure practice, we take it for granted he is destitute of one very important requsite to a good practitioner, namely, moral honesty. Indeed, a man who will do this, should be held in utter contempt by every respectable member of the profession. These remarks have been elicited by an advertisement with the above *attractive* heading, recently sent to us by a friend in Virginia, of a dentist, who proposes to perform operations on the teeth, at prices, which, if faithfully executed, with constant employment, would leave him about three dollars out of pocket at the end of every day.

Dr. Dumont.—The many friends of Dr. S. H. Dumont, who graduated with so much honor at the Baltimore College of Dental Surgery, in 1850, will be glad to learn that he is gradually but surely introducing, in Brussels, the more efficient and serviceable operations of our country.

Dr. Dumont has much prejudice and ill-will to combat, but is determined to succeed:—and from what we know of his skill and integrity, we predict for him a brilliant professional career when the Belgians have had some further opportunities of comparing his operations, with those generally performed on the continent of Europe. We wish him success for his own good; but the consequent good to his patients will be a myriad-fold greater.

Mechanical Dentistry.—It was supposed by many, ten years ago, that mechanical dentistry had very nearly reached the *ne plus ultra* of perfection, but its progress since that time has been as rapid as at any former period, and in no branch of it, is improvement more manifest than in the manufacture of porcelain teeth in *blocks*, with artificial gums. The objections which existed a few years ago to dental substitutes of this sort, on account of their weight, and greater liability to be broken than single teeth, have, in a great measure, been removed by the manner in which they are now constructed and secured to the base. We recently had two double sets presented to us by Samuel Wardle, dentist, of Philadelphia, gotten up in a most beautiful style. The carving, the body, the enamel and gum, as well as the mounting, all are indicative of thorough knowledge and practical skill in this department of dentistry.

New Subscribers.—The rapid increase to our subscription list has exhausted Nos. 1 and 2, of vol. 2, New Series. We cannot, therefore, supply all our recent subscribers with this volume. Unless otherwise directed, we will enter their names on our books for next volume.

THE

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ARTICLE I.

Treatment of Dental Caries, complicated with Disorders of the Pulp and Peridental Membrane. By ROBERT ARTHUR, D. D. S., M. D.

NO. V.

IN the last number I endeavored to show the propriety and utility in some cases, and the necessity in others, of the extirpation of the pulp when it becomes exposed. I also explained the object expected to be accomplished by the performance of this operation, and discussed the question of the relative propriety of using arsenic for the purpose of destroying the vitality of the pulp previous to its removal, and taking it away without preparatory treatment. I endeavored to show that the objections commonly made to the use of arsenic for this purpose were not well founded.

The indications which are to determine the necessity of a resort to this operation, the best manner of using arsenic for the purpose, the symptoms developed by its action, and the manner of removing the pulp, with other relative subjects, will occupy the present number.

I have insisted strongly upon the importance of preserving the pulp alive and in healthy condition, when this can be done, but in many cases it will be found exceedingly difficult to determine whether the entire extirpation of the pulp is absolutely necessary, or whether the means indicated in a former number are applicable; whether the caries has reached so nearly to the pulp as to render useless or injurious any attempts to fill over it.

It is my decided impression, although I have not yet perfectly satisfied myself that it is a fact—that when the pulp is once fully reached by the caries, that it is generally beyond treatment except by extirpation. I believe that contact with the decomposed bone and the chemical agents which bring about its decomposition, will invariably and inevitably produce inflammation of the pulp; and I am inclined to believe that where the pulp remains in a perfectly healthy condition, covered by softened bone, that this is not decomposed, but as I have already intimated, bone in the first stages of formation; and that in all cases where the pulp is carefully uncovered so as to perform the operation of "capping," as it is technically termed, before pain has occurred, that a perfectly healthy substance is taken away, and that the very questionable alternative is taken of bringing and keeping the pulp in contact with atmospheric air. That under such circumstances, a new protective covering of bone may be secreted by the pulp I cannot deny, as it has been positively affirmed by gentlemen in the profession, of high standing, and of whose skill and truthfulness there cannot be a doubt, but I am obliged to say, that no fact which satisfies me of its truth has ever come within my own observation.

All cases, then, in which no pain of any kind, or other evidences of inflammation has occurred, no matter what may be the extent of the caries, I regard as within the reach of the operation indicated in a former number and alluded to above. I state this as a general rule, for I am aware that many persons lose their teeth by decay, without, according to their own statement, suffering pain; but I doubt whether such teeth did

not give rise in the progress of the destruction of the pulp to some painful symptoms of inflammation, although they may have been very slight.

Pain, therefore, in my view of the case, may be regarded as an indication of such a condition of the pulp of a tooth as to call for its removal. But as pain occurring in and about the teeth may come from a variety of causes, it must be understood that I mean pain occurring under certain circumstances, and of a peculiar character.

In order to make this subject clear, it will be necessary to go briefly into a consideration of the various kinds of painful symptoms of the teeth, and their causes, to distinguish them from that which occurs in consequence of true inflammation of the pulp. This has already been very clearly done by Dr. White, in the series of articles alluded to in the introductory number of these papers, and although what I have to say may not differ materially from what will be found in them, it is necessary in this connection, and must, of course, take some peculiar coloring from my own view of the matter.

I shall notice, amongst the causes which give rise to painful sensations about the teeth,

1st. Inflammation of the dentine.

2nd. Inflammation of the peridental and alveolar membranes.

3rd. Sympathy with other painful teeth.

4th. Neuralgia.

5th. True inflammation of the dental pulp from contact with substances foreign to it.

1st. Pain caused by inflammation of the dentine may occur at any stage of the progress of caries, and frequently does occur when it is very slight. It is rarely intense, and is sometimes characterised by patients as a "grumbling" pain. Sometimes it can scarcely be called pain, a simple consciousness of something wrong, an uneasiness about the part, is all which indicates its presence. In ordinary states of health, pain rarely occurs spontaneously in such cases, but cold—an extraordinarily plethoric state of the system—febrile excitement—

pregnancy—inflammation of the pulp of some other tooth on the same side of the mouth, are sufficient to induce it. Contact with any hard, and sometimes with moderately hard, substances, or substances below or above the temperature of the blood, is sufficient at times to cause pain, and an attempt to remove the dentine when it is in this condition, with a cutting instrument, will occasion, to some persons, pain of a peculiarly excruciating character. I have already alluded to this in a former number.

2nd. Inflammation of the membranes of the alveolar sockets. From this cause, very acute and long continued pain, which, from its character, it is difficult to distinguish from pain caused by a high degree of inflammation of the pulp, may be experienced.

In these cases there is always more or less tenderness to pressure, which, indeed, will always determine whether there is any inflammation of the peridental membrane, or of that which lines the alveolus. The pain may vary in a degree from slight uneasiness about the part to exceedingly acute toothache, as it is commonly termed.

The diagnosis of these cases, however, is not very difficult, for it is generally occasioned by teeth in which the nerves are dead. It may, it is true, and frequently is, complicated with inflammation of the pulp arising from any cause.

It is also occasioned by tartar encroaching upon the fangs and destroying as it accumulates, the gum, alveolar processes, and the membranes of the sockets. Some of the most severe cases I have ever met with owe their origin to this cause.

In these cases the contact of cold or hot substances will sometimes occasion severe pain. Sometimes, too, it may be well to mention, while on this subject, severe pain follows the extraction of teeth in this condition, continuing with great violence for several days after their removal.

3rd. Sympathy with other painful teeth. It is a fact well known to those who have observed the phenomena attendant upon diseased teeth, that pain may be felt in those which are quite distant from the tooth, or teeth, in which it originates. This is so common, that an experienced dentist will never rely

entirely upon the patient's indication of the painful tooth when extraction is required. Mere proximity does not account for the fact, as sometimes teeth in the opposite jaw to the one which may be affected will be painful. Sometimes the really diseased tooth will not be at all painful, and will only be detected by the fact that it is found to be carious, and to some extent, affected with peridental inflammation. This kind of pain may occur in a tooth perfectly sound; although I am not so well satisfied that this is so; but it is generally an indication that the tooth in which the pain exhibits itself from sympathy with one which is diseased, is, itself, more or less diseased, and attention ought to be directed to it, after the one which is the original cause of the painful symptoms is attended to.

Pain occurring from this cause varies in intensity; it may be slight, and the whole of the teeth on one side of one of the jaws or face be affected at the same time, or it may be confined to a single tooth, and thus may exhibit all the characteristics of pain arising from genuine inflammation of the pulp.

4th. Neuralgia.—This is another prolific source of painful sensations about the teeth, and this may affect teeth which are perfectly sound, and apparently healthy. This affection, obscure in its pathology, and exceedingly difficult of treatment, is one, to the observation and study of which, every dentist ought to give careful attention.

The character of the pain of neuralgia varies so much that it cannot be described unless all the terms used to describe painful sensations are employed. A general distinction, however, between pain occurring from this and other causes, has been made, which will assist, to some extent, in judging of the presence of neuralgia. "The description of pain, unattended with inflammation, differs from the pain of inflammation, although the former is subject also to varieties in kind, duration, and intensity. Throbbing, lancinating, or pulsatile pain, *i. e.*, pain accompanied with a sense of motion of the fluids in the parts, is the most characteristic distinction of acute inflammation; and an obtuse aching, or heavy pain, belongs to a con-

gested state of the local circulation. Neuralgia is generally attended, more or less, with muscular cramp or spasm, and such pain is either intermitting or periodical.—*Travers* on *Inflammation*, p. 47.

I am not sure that the condition of the affected teeth materially modifies this affection. As far as my experience goes it is quite as liable to exhibit itself in perfectly sound teeth as in any others. Where there are no diseased teeth in the mouth, and pain occurring, cannot be attributed to any of the causes enumerated above, and about to be stated, it may be suspected to proceed from this cause, and an effort made to account for it on this ground.

5th. True inflammation or congestion of the dental pulp.—I come now to the consideration of the circumstances under which pain occurring, may be suspected to proceed from this cause.

Pain produced by inflammation of the dental pulp is not so peculiar in its character as to be at once, and in all cases, distinguished from pain arising from any one of the causes just enumerated. In many cases it may so nearly resemble any one of the species here alluded to, that it cannot be distinguished from it. This is what renders diagnosis in the case sometimes difficult.

Sometimes, however, the pain resulting from inflammation of the pulp, together with the extent to which the painful tooth is affected with caries, is of such character that it cannot be mistaken, and no operator of any experience will be deceived. But as the inflammation or congestion giving origin to painful symptoms may subside spontaneously without leaving a trace behind, and the patient forgetting what he had suffered, does not describe accurately the symptoms, and as it can never be ascertained with perfect precision, by examining the cavity of decay, how nearly the caries has approached the vicinity of the pulp, it frequently becomes an exceedingly nice question to determine, whether an attempt may, with any hope of success, be made to preserve the pulp alive, or whether the operation of which I am now treating is indicated. There are some in-

stances, indeed, in which this is actually impossible, and the matter can only be determined by resorting to a test which I shall presently describe.

On examining the teeth of a patient in my hands, if I find any which, from the depth, extent, and situation of the caries, give me reason to believe that the pulp has suffered, or is in danger of suffering, I proceed to ascertain their exact condition.

I first inquire of the patient if he has suffered pain from the tooth, or teeth, in question. If none has occurred, and strong, hard pressure made upon a pledget of cotton placed in the cavity gives no pain, I proceed as in ordinary cases.

If no pain has occurred previously, and strong pressure produces pain, which, however, immediately passes away, I proceed as already directed in the third number of these papers.

It sometime happens, even before the pulp is in any way injuriously affected, and the practice above is applicable, that pressure made, as directed here, will produce pain which does not immediately subside. In many of these cases, the teeth will be insensible to the effects of external agents, with which they may ordinarily be brought into contact, and as a general rule, they may be distinguished by the fact that no pain of consequence has, up to the time of examination, occurred spontaneously; or if pain may have occurred, it is of such character as could be referred to inflammation of the dentine.

If violent and continued tooth-ache has occurred, although the tooth coming under treatment may be perfectly free from pain at the time, it may be generally regarded as an indication that the pulp is in such condition that it cannot be successfully treated by any other means than its entire removal. But to be certain that such pain as may have occurred did not proceed from inflammation of the dentine affecting the pulp, the cavity must be examined with great care. In the first place, I carefully wash out the cavity with tepid water, used by means of a syringe, having a tube, curved nearly at right angles with the barrel. This will be found a most valuable adjunct in this and other operations on the teeth. In many cases where

the bottom of the cavity can be plainly seen, a small opening into the pulp cavity will be discovered. If this is not apparent, I remove carefully, with a small instrument, the softened bone situated immediately over the most prominent point of the pulp. In these cases it will generally be found so soft that a delicate instrument used gently—and all rough and rude manipulations ought to be carefully avoided in these cases—will push through it. If, however, it should be found to possess considerable consistence, it will be advisable to attempt the operation above alluded to, unless pressure produces so much pain as to put it out of the question.

Inflammation of the pulp may be attributed to two causes, one proceeding from actual contact with some substance or agent which is foreign to it—the other from the irritation caused by a highly inflamed state of the dentine. In both species, pain occurs, but one will, in some cases, subside, and leave the pulp in as healthy condition as any other tissue, after the subsidence of inflammation; the other may, indeed, pass away, but the pulp has previously been deprived of the protection with which nature has furnished it, and which it may not be able to restore, and it is probably liable to a return of the inflammatory condition.

When inflammation exists, characterized by violent pain at the time a case comes under treatment, there will be little question about the condition of the tooth, or the steps to be taken.

I find it extremely difficult, without being too diffuse, to give such full directions to the tyro in the profession as will enable him to treat, without embarrassment, the variety of cases of this kind which will come into his hands—experience alone will enable him to do this—and these hints, I am aware, can be valuable only in assisting him at the outset to avoid some serious difficulties. To the practiced operator, these details will probably be tedious and useless.

After having indicated, to some extent, the means by aid of which to ascertain whether the pulp is in such condition as to render its extirpation necessary, I come now to a closer consideration

of the process by which this is accomplished. I have already discussed the relative propriety of its removal with or without the use of arsenic for the purpose of first destroying its vitality, and have declared my decided preference for the latter method.

Even with this invaluable agent for the destruction of the vitality of the pulp, great difficulties have been encountered in making it effectual; and there are many points about the best means of applying it, and the symptoms to which it gives rise, of importance to the novice in its use, and well worthy to be examined in detail.

The form in which arsenic is generally used for this purpose, is that of the arsenious acid, (As Oz,) known also as arsenic, white oxyde of arsenic, white arsenic, ratsbane. A few words in relation to its nature and properties may be useful.

Arsenious acid is sometimes found native, but generally in combination with copper, iron, cobalt, and nickel, as a sulphuret, from which it is obtained by roasting these ores. It is principally obtained for commercial purposes from cobalt, in which it sometimes exist, in the large proportion of fifty or sixty per cent. It is abundantly prepared at Joachmil, in Bohemia, from arsenical pyrites, and arsenical cobalt, which are roasted in reverberatory furnaces, and the vapors condensed in a long flue, or series of chambers, the contents of which, submitted to a second sublimation, affords the *white arsenic* of commerce.—(*Brande.*) The commercial arsenic is white, transparent, and glossy when fresh, becoming milky and opaque by exposure; so that the two states are observed on breaking a mass, which is opaque on the exterior. As it is sold in powder in the shops, it is often adulterated, and it is always advisable to purchase it in the lump. If wanted perfectly pure, it may be obtained by pulverizing the commercial article, and digesting it for some hours in aqua ammonia, at a temperature of 160° or 170°, frequently shaking the vessel; the clear, warm solution is then poured off, and in cooling it, deposits octohedral crystals of the acid, pure and free from ammonia.—(*Berzelius.*) Arsenious acid is soluble in water, in acids, and oils. The opaque is more soluble than that which is transparent. It

has been ascertained that 0.96 of the transparent, and 1.25 of the vitreous, dissolved in 100 parts of water at 60°; at 212° 9.68 of the former, and 11.47 of the latter dissolves, and when these solutions are cooled down to 60°, 1.78 of the vitreous, and 2.9 of the opaque are retained.—*Guibourt.*

On other authority, it is stated, that the transparent variety is much more soluble in boiling water than the opaque.—*(U. S. Dispensatory.)* Used internally, arsenious acid acts as an alterative and febrifuge. It is exhibited in doses of a sixteenth to an eighth of a grain. Applied externally it acts as a caustic.

Besides the arsenious acid, arsenic in another form is used; as it is found combined with cobalt in the cobalt ore. Cobalt is generally of a dark, or reddish gray color. It sometimes contains as much as 55 per cent. of arsenic.—*(Ure.)* It is not soluble in water, or oils, at any temperature.

I have used cobalt a great deal for the purpose of destroying the pulp, for some time past; I found that it possessed some advantages over arsenious acid when employed in the usual way; but a new method of using the arsenious acid, which I shall presently describe, gives this agent a decided preference over cobalt in consequence of its more easy solubility, and more rapid action. Indeed, on reflection, upon a suggestion made by Dr. White, I do not see how, theoretically at least, cobalt should be preferred to the arsenious acid; for if the pulp is to be destroyed, the more quickly this is accomplished the better. But for the purpose of removing that excessive sensibility of the dentine, described in a former number, this agent is invaluable; and I cannot refrain from taking this opportunity again to urge a trial of it, for this purpose, upon the profession. I have now been using it for nearly two years with the most satisfactory results.

The preparation of arsenious acid generally used for the purpose in question is, equal parts of arsenious acid and sulphate of morphia, rubbed up in creosote, to the consistence of a thin paste. As creosote is so disagreeable to many persons, it has been proposed to substitute for it some of the essential oils.

A writer in the "Journal" has suggested oil of origanum. I have not tried any of these, but think the suggestion a good one.

This compound is used instead of the simple arsenious acid, in order to prevent the pain caused by the destructive action of the acid. It has been suggested by Dr. White that the creosote has no agency in diminishing the pain caused by the action of the arsenic, except in dissolving the arsenic more perfectly, bringing its particles more certainly and rapidly into contact with the pulp, and thus so quickly destroying its vitality as to prevent irritation. The morphine, in the preparation, he supposes to be the agent which prevents the pain, which would otherwise be produced. I do not, however, agree with him in this view of the case.

About the twentieth, or even thirtieth part of a grain of arsenious acid, it is generally agreed, is sufficient to effect the destruction of the vitality of the body of the pulp. This is applied by touching to the arsenical paste, a small piece of raw cotton or lint, and laying it in the cavity, against the part of the cavity nearest the pulp. If cobalt is used, it will be found simply sufficient to saturate the cotton with creosote and touch one side of it to the powdered ore.

A very nice and important step in the process, is properly to secure in the cavity the preparation employed. As the exposed pulp is often exquisitely sensitive, it will not bear the slightest pressure, and it was at first found quite difficult to confine the preparation in the cavities of some teeth without making so much pressure upon the pulp as to render the process exceedingly painful. Several methods have been devised to escape this difficulty. Dr. Maynard covers the preparation with a lead cap, and then fills the cavity of decay with wax, into which a quantity of cotton is worked. The lead cap, it is obvious, so protects the pulp, that enough pressure can readily be used to make the wax sufficiently firm to remain as long as desired. Dr. White suggests passing a ligature around the tooth where the cavity is on a lateral surface, and when difficulty is experienced in securing the cotton placed over the prep-

aration. In some cases, this method is invaluable. The means I have generally used, and which in the large majority of cases I find perfectly effectual, is to make an alcoholic solution of gum sandarac, and saturate with it a piece of cotton sufficient to fill the cavity over the preparation. When the cavity is deep enough, and sufficiently well shaped to hold a filling of any kind, cotton prepared in this way is very easy to use for the purpose, it will effectually exclude moisture, prevent the escape of a particle of the preparation, and remain any desired length of time. The saliva, on coming into contact with it, immediately combines with the sandarac, the alcohol evaporates, and a firm filling is quickly produced.

I do not regard the complete exposure of the pulp, by the removal of all the decomposed bone which may cover it, as a necessary preliminary to the application of the arsenic. On the contrary, much pain to the patient is often avoided by applying the preparation without first removing any bone by which the pulp may still be covered. This practice, I am aware, conflicts with what appears to be correct theory in relation to the matter; for it might be supposed, as has been suggested by Dr. White, in the articles before alluded to, that the action of the arsenic upon the pulp would produce irritation and a consequent flow of blood to the part, so that the usual consequences of the inflammation of any tissue in a confined bony cavity would follow, and great pain occur. Experience, however, my experience, at least, shows that this is not the case, and it will often be found, where the patient is suffering violent pain, and the affected pulp is still not fully exposed, that the application of either of the arsenical preparations, as above directed, will, instead of augmenting the pain, give almost immediate relief. In most cases, indeed, this action of the preparations of arsenic, when combined with creosote, seems to give rise to but little, if any, irritation.

Whenever, therefore, I determine upon the performance of this operation, I merely syringe out the cavity of the affected tooth with tepid water, dry it, and immediately, without any farther preparation, except, in some cases, to cut away the softened bone near the opening of the cavity, so that it will

more readily retain what is placed in it—make my application. After the lapse of twenty-four hours the pulp may be fully exposed with but little pain.

There is some controversy about the length of time the arsenic should be allowed to remain for the purpose in question, and also with regard to the propriety of a repetition of its application. The common practice is to apply it in the manner above described and to allow it to remain from twelve to forty-eight hours, and there seems to be a great and general reluctance to apply it more than once. It will be found, however—at least such has been my own experience—that the pain attendant upon the removal of the pulp is not avoided, in any great degree, by the use of arsenic in the way just mentioned. When the arsenic is removed, after having remained only the length of time just indicated, the body of the pulp will be found entirely deprived of vitality, and of course sensibility, and can be removed with but little inconvenience to the patient, but farther than this, the effect is rather an exaltation of the sensibility of the portion still remaining in the fang or fangs; and the removal of this part of the pulp is, in almost every case, exceedingly painful. To destroy the vitality of this part it has been proposed to repeat the application of arsenic; but this has been objected to on the ground that bad consequences were likely to result from it by its passage through the foramen to the investing membrane. In a preceding number of these papers I have examined this question. I have had no hesitation in applying the arsenic repeatedly for this purpose, and have never seen any injury result from it. The same has been stated to me by Dr. Maynard to be his own practice and experience. It has been proposed to substitute for the arsenic some caustic more rapid in action and less diffuse in its effects; I have carefully tried for the purpose, caustic potassa, nitrate of silver, chloride of zinc, and other similar agents without satisfactory results.

The difficulty with all these agents, arsenic included, even if no fears of injurious results from its use were entertained, lies in the impossibility, by any methods known to me, of bringing

them into contact with the parts of which it is desirable to destroy the vitality after the body of the pulp is removed. Till lately this has been an extremely perplexing point to me, and I will mention briefly the various expedients which have been resorted to in order to overcome the difficulties of the case. Dr. Maynard mentions two methods adopted by him, viz. to apply the preparation by means of a piece of thread, the end of which he dipped into it so as to take up the desired quantity and passed into the fang; and to take up some of the preparation upon a fine instrument and passing it to the end of the fang withdraw it, leaving a small quantity of the arsenic behind. I have modified these methods by taking a fine instrument, warming the point and touching it to gutta percha so as to take up a very small quantity of the gum. This was touched to the arsenical preparation and thus armed was passed into the fang to the extremity and allowed to remain twenty-four hours. Other expedients of the same nature were tried, and although many of them promised well, did not meet my expectations when applied to practice.

In reflecting upon the matter, it was plain to me that, although considerable inflammation of the portion of the pulp not destroyed by the arsenic, occurred, and even extended to the peridental membrane, that no particles of arsenic reached these parts; for if the inflammation in question were caused by the presence of particles of arsenic, the death of the parts would speedily follow, but as these parts retained their vitality for weeks and months afterward, it was fair to infer that they could not have been reached by any particles of the preparation. But it appeared to me equally plain that if a sufficient quantity of the arsenic were used, the pulp itself would answer as a vehicle to convey it not only to the extreme parts of the fang but, if allowed to remain long enough, to the peridental membrane; for as the surface to which the arsenic is applied in the first instance is destroyed, new portions, combined as it is with so subtle a fluid as creosote would readily pass by capillary attraction through the dead to the living parts. It appeared to me then a great mistake to remove the pulp, as it is deprived

of vitality, for this, if my view is correct, is taking away the best means of bringing the arsenic into contact with the part of the pulp most difficult to reach.

Reasoning somewhat in this way, I determined to allow my preparation to remain a longer time, and after some experiments proposed about a week, when cobalt and creosote were used. I found this plan much more effectual than any other which, up to that time, I had tried, and warmly recommended it to the profession. It was, however, with reason, urged against this method that it was impossible to tell with exactness the extent of the action of the arsenic in any given time, and there was danger of allowing it to remain so long as to pass through the foramen and thus destroy the vitality of the membranes within the alveolus. It was necessary, therefore, in order to be on the safe side, to allow its action to stop short of the foramen, and leave a portion of the still vital pulp to be taken away. For this reason, although a great improvement upon the old method, it was so far defective, and the termination of the operation was still more or less painful.

But this step led me to a method which is free from any of the objections and defects which I found in that just described, answering effectually the desired purpose, and placing in the hands of the operator the means of determining, with exactness, the progress of the action of the arsenic applied, and of stopping it at the desired point. This method removes from the process its most perplexing feature to the operator and the most repulsive to the patient.

I have now discarded the cobalt and again taken the arsenious acid, because it is soluble in the creosote, and because I desire more rapid action. It will be perceived by those who have followed me thus far, that I have arrived at these conclusions since the last number of these papers was written.

I have just said that I am satisfied that if a sufficient quantity of arsenic were used and allowed to remain long enough, it would travel along the pulp and effect its entire destruction. More, probably, would be required for the purpose than is generally used, for as it combines with the pulp, as it destroys

its vitality and becomes inert, there must, of course, be a sufficient quantity to act upon the whole. If it were possible to know the exact amount required, in every case, to effect this object, a great deal of trouble would be saved—but this is, of course, in the nature of things, impossible. I therefore apply the arsenious acid in the usual quantity and in the usual manner.

After the lapse of twenty-four hours, knowing that the vitality of the whole of the pulp is not destroyed, and not knowing whether the minute quantity of arsenic employed has not exhausted itself, I renew the application. On the next day, I remove it, and pass a very fine instrument, prepared for the purpose, into the fang, till a sensitive point is reached, making a mark upon the instrument to indicate the depth to which it has gone. I apply the arsenic again, and the next day examine with the same instrument again, and so on, till the vitality of the pulp is completely destroyed to the end of the fang. The action of the arsenic is not so rapid as to give any ground for apprehension of injury, and sufficiently so to effect the desired object in about a week In this manner I have succeeded in destroying effectually the pulp, without observing a trace of inflammation about the tooth.

If the tooth under treatment has several fangs, the instrument used may be passed into each, and as the vitality of the pulp in each fang is ascertained to be destroyed, its connexion with the main body of the pulp may be cut off.

I have had a good deal of experience in this practice of destroying the nerve, and I do not hesitate now, from the trials I have made of the process proposed, to declare that it accomplishes an object which I have not yet been able by any other means to effect—certainty of results.

After the vitality of the pulp is completely destroyed, its removal, in some cases at least, is not very difficult. In the incisor and canine teeth, it is quite easy, but more difficult of course, in the bicuspis and molar teeth. This part of the operation demands some special attention.

The first thing to be considered is, the instruments necessary

for the purpose. It is, of course, understood, that in most cases, all which has to be done, is to remove from the fang or fangs of the tooth under treatment, a comparatively soft substance unlike the decayed or decaying bone of the original cavity of decay, and not requiring so high a temper as ordinary excavators. But in regard to instruments intended for this purpose there are several particulars to be observed. They must be small enough to pass into the canal of the fang, to the very extremity—they must have some elasticity, enough to take the slight curves presented by many fangs coming under treatment, and that formed by the relative position of the fang to the opening from the external cavity—they must also possess sufficient strength and toughness to prevent them from breaking when used for the purpose in question—and must be given such form as will enable them to seize hold of the pulp and draw it out. The best material for these instruments which I have yet found, is fine steel, well annealed. The best steel for the purpose, of which I have any knowledge, is piano wire.

Steel is annealed by being heated away from contact with the oxygen of the atmosphere, and kept from contact with it until it becomes cold. A convenient method of annealing steel wire for the purpose in question, is to cut it into proper lengths, and put it into a piece of gun barrel, in each end of which has been fitted an iron plug to render it air-tight. It should be heated to redness and allowed to remain on the hearth where it is heated till it becomes cold. The more slowly this operation is performed the more uniform and soft will be the steel.

After annealing the wire, cut into the proper lengths for the instruments, it is fitted into suitable sockets. For this purpose I generally use steel wire with a socket drilled in it, into which the wire for the instrument is cemented. But any convenient form which may suggest itself to the operator, will, of course, answer. It will be found convenient to have a considerable number so that there may be at hand, instruments of a variety of sizes, thus saving the necessity of frequently changing them.

When securely fastened into the sockets they may be filed down to the required size. It is advisable for those who have never practiced this operation to prepare teeth of the several classes, and make the instruments of such size that they will readily pass into the smallest fangs. In order to obtain the most desirable form, and to preserve as much body as possible, to the instrument, it has been suggested, (by Dr. White,) that they should be square, except in cases where it is necessary that they should correspond with the form of the fang. After they are reduced to the desired size, they should be well burnished, (a suggestion of Dr. Maynard;) this will give them a slight temper, and increase the little elasticity they have acquired in the process of filing. There should now be cut upon them with a sharp knife, small beards, looking toward the handle of the instrument. Care must be observed, too, that the points of these little instruments should be made sharp, so that they will pass alongside of the pulp in the fang, and not push it upward in the attempt to take it away. The use of these instruments is too obvious to need any elaborate description; they pass readily into the fang and will draw out the pulp as they are withdrawn.

Sometimes the fang will require enlarging, and this may be done with a very simple excavator, contrived by Dr. Maynard. It is formed somewhat like a hoe, but with the cutting edge at a more acute angle with the handle. It is made, of course, of various sizes, to suit any case in hand. When used, it is passed into the fang, and pressed slightly to the side toward which the cutting edge is turned and withdrawn—it cuts as it is withdrawn, and brings away with it the chips it makes. It is important that it should be made at a proper angle, for if it varies from this it will either not cut at all, or merely scrape the bone. If properly made and sharpened it will cut quite rapidly. This little instrument is exceedingly useful, too, for enlarging the opening of the pulp cavity before the vitality of the body of the pulp is completely destroyed; for this purpose it is passed gently into the pulp cavity and in withdrawing it the edges are gradually cut away.

Several little matters are to be noted at this place. It is not always so easy as it may appear to the inexperienced to remove the pulp from the fangs. It is not always sufficient to pass the instrument prepared into the fang to bring out the pulp with it on the first trial. The pulp is often toughened by combining with the arsenic or cobalt, holds firmly and resists repeated attempts to take it away. If any vitality remains, this part of the operation becomes exceedingly perplexing and painful to the patient; but I hope the method which I have suggested will obviate this difficulty. Not unfrequently the pulp will be found partially ossified. These ossifications of the pulp sometimes present themselves in the form of spiculæ in the fangs; but I have sometimes found the whole body of the pulp completely ossified up to the openings of the fangs. These ossific deposits will be found free, but often it will be necessary very much to enlarge the opening to the pulp cavity to get them out of the way.

If, by accident, the instrument used should break—and this is an accident which careful handling should make very rare—it will sometimes be found difficult, and it may be impossible, to remove. If not jammed in the fang so as to be immovable, it may, in many cases, be withdrawn by rendering a small instrument magnetic, and passing gently up till it comes into contact with the fragment to be removed. The use of a magnetized instrument was suggested some time ago by the late Dr. John Harris, for a similar purpose. Once or twice during my practice I have found it impossible to remove the broken fragment of the instrument from the fang, and was obliged to fill without regard to it. I have observed no unfavorable results in these cases which I could attribute to this cause.

There is another important matter which may be appropriately considered here, although it has a more important bearing upon the perfect filling of the fang after the pulp is removed, viz. the best means of gaining access to the fangs of the teeth under treatment. This, at times, requires the exercise of considerable ingenuity, and unless the proper means are resorted to, in many cases the operation will necessarily be imperfect

and ineffective. What I mean, will be more clearly understood, by taking, for example, the case of an inferior molar tooth, decayed to the pulp on the posterior proximate side. It is obvious that it will be difficult to reach the opening of the anterior fang from this cavity, and, indeed, it will also be found quite difficult to work readily at the posterior fang, unless a considerable portion of the tooth toward the anterior proximate surface is cut away. This opens a novel and interesting feature of this operation, and the question now comes, what is the best method of gaining access to these fangs. Cutting away the crown of the tooth, as in that chosen for illustration, so as to reach the fangs, has two objections: it is a very laborious process, and takes away a large portion of the tooth which would be useful for mastication, and although this portion may be restored by the filling, it also involves a great deal of labor, consumption of material, and necessarily adds to the cost of the operation. A much more easy and feasible plan is to make an opening somewhere through the sound bone, and as there is now a choice of location it will be well to consider and ascertain what part is more convenient for the purpose. In order to make this part of my subject plain, I shall take up for consideration each class of the teeth separately. I feel bound to say here, that I am indebted to Dr. Maynard for suggestions in relation to this matter, which have been of great value to me.

Incisor Teeth.—When the pulp is exposed on one of the lateral or proximate surfaces of these teeth, if the cavity is not very large it will be best to make the opening, for operating upon the pulp, on the lingual surface just below the most convex point, particularly in case of the central incisors. Through this opening the necessary instruments may be passed almost vertically into the canal of the fang. It is objectionable to cut down toward the lingual surface, if the cavity of decay is small, because it so far takes away from the strength of the tooth. It will of course be understood that when force is applied in a vertical direction, even with the most delicate instruments, it will be at a great advantage over its application out of this line,

and the filling of the fang can doubtless be made much more perfect.

The inferior incisor teeth cannot be treated in this way—it would be more difficult to reach the pulp cavities of these teeth from the lingual than from the proximate surfaces. All that can be done is to cut away the labial wall of the cavity till the openings of the fang are fully exposed. As these teeth are generally less conspicuous than the superior incisors this treatment is admissible.

Cuspidati.—There are two reasons why it will generally be found advisable when it is desirable to reach the pulp to use the cavity of decay when it occurs on the proximate surfaces of these teeth for this purpose, rather than to make a new opening on the lingual surface. In the first place, these teeth are thicker across from the labial to the lingual surface than the incisor teeth, and can, without injury, bear greater loss of substance, and for this reason the pulp cavity is less easily reached from the point indicated above than in the incisor teeth.

Bicuspids.—The manner in which these teeth most commonly decay, renders any particular directions unnecessary. From the cavities of decay it will generally be found easy enough to reach the pulp cavity. If, however, the pulp is exposed from decay on the posterior proximate surface, and the anterior surface is untouched, it may be well to say that the pulp cavity can be most easily reached by cutting down the cavity of decay toward the anterior surface.

Molar Teeth.—It is with these teeth that the greatest difficulties are encountered in the treatment of the pulp. The variety of places in which they may be decayed, their position in the mouth, and the number of their fangs, all serve to make a very considerable exercise of ingenuity necessary. I can only hope to afford some help by indicating, in as full detail as seems useful, the general plan resorted to to overcome these difficulties.

The *Superior Molar Teeth*, for some reasons, are more troublesome to treat in this way than those of the lower jaw, unless the caries has fully opened the pulp cavity and exposed the

entrance to the fangs. I shall examine these teeth with reference to this object, as they are affected by caries, in most of the situations where it is likely to affect them. *Anterior proximate surface.*—From this point, if the caries is extensive, all the fangs may be reached, by cutting down the pulp cavity toward the center of the crown. If the caries is slight in extent, an opening made near the gum on the labial surface will make it easy to reach the buccal fangs. The palatine fang in such cases may be reached by cutting down the cavity of decay toward the point formed by the lingual and anterior proximate surfaces. *Posterior lateral surface.*—Through an opening at this point but little more can be done than to make the first application of the arsenic. I have reached the pulp cavity in such cases by making an opening at the center of the crown and cutting down to the pulp cavity. This will be found a laborious operation, but I do not see how it can be avoided, unless openings are made both in the lingual and labial surfaces, or a very large opening on the labial surface. *Lingual surface.*—In this case the palatine fang only is accessible; to meet the difficulty, an opening must be made on the labial surface as before directed. *Labial surface.*—From this point as it is more accessible, the palatine fang, if the decay is large, may be reached, at an obtuse angle.

It will, perhaps, be understood that these additional openings into the pulp cavity cannot be attempted until the vitality of at least the body of the pulp is destroyed. This is, of course, done by making the arsenical application through the original carious opening. It will, however, be necessary to gain easy access to the fangs before the entire pulp can be effectually deprived of vitality and removed.

Inferior Molars.—These teeth, I think, will generally be found less difficult to treat in this way than those of the upper jaw, with the exception of the trouble encountered with the saliva; there is also a difficulty arising from the form of the fangs, which, it is known, are generally flattened laterally, slightly enlarged both toward the tongue and cheeks, forming,

in each fang, two canals with a narrow fissure between them. When these teeth are decayed to the pulp cavity on the crown, it is only necessary to cut down into the cavity and open a free way to the fangs. If it is on the anterior surface it will be sufficient to cut down the roof formed by the bone of the crown, so as to reach the posterior fang. If the caries is in the posterior proximate surface, it will be best to make an opening through the sound bone on the labial surface near the gum, and from this place enter both fangs.

The *dentes sapientiæ* of the lower jaw are not generally more difficult to fill than the first and second molars. If decayed upon the posterior surface it will be best to cut away the crown so as fully to expose the fangs; as these teeth are generally smaller than the other molar teeth this will not be found so laborious, indeed I have usually found when the pulp is exposed from caries at this point, that so much of the bone is decomposed as to allow of easy access to the pulp cavity. When the caries affects the crown no difficulty presents itself. The upper wisdom teeth are more difficult generally to treat than the lower ones, particularly those of the left side, as they are not so easy of access.

I find difficulty in describing minutely operations like these, in consequence of the want of a dental nomenclature. Until every important part of each tooth receives its appropriate name this will continue to be difficult. Good service would be done to the profession by the careful preparation of such a work.

There is a point to be considered here of considerable importance, it is this: how is it to be ascertained with certainty that the pulp is entirely destroyed? At first sight this may appear quite an unimportant inquiry, for it will be supposed that as pain is an indication of vitality, when no pain is caused by the use of instruments for the removal of the pulp, it alone will be sufficient assurance that there is no vitality left. But the difficulty is in this: the canal passing from the pulp to the alveolar cavity does not always terminate abruptly near the extremity of the fang, leaving a mere capillary foramen through

the fang; there is often a gradual and regular narrowing of this canal till it reaches the alveolus, and not unfrequently the foramen is sufficiently large to permit the passage through it of the delicate instruments used in this operation. This will be shown by passing such instruments through the pulp cavity and fangs of extracted teeth; it will be found in doing this that the finer instruments will readily pass through many of them, even when the foramen is not very perceptible to the naked eye.

This, it will be perceived, is a nice point—it is certainly desirable, at least, if not necessary, as I have endeavored to show, to remove entirely the pulp from the canal; but how to accomplish this, in all cases, without running risk of wounding or otherwise injuring the parts exterior to the fangs, and setting up inflammation here which it will be difficult to subdue, is a question well worthy of attentive consideration. In many of the teeth the canal terminates somewhat abruptly, near the extremity of the fang, and the instrument used will be stopped at this point. Sometimes the difference between the diameter of the canal at this place and that of the foramen is so slight that the instrument used, although stopped at first, may be passed through the foramen if a little force is employed. In these cases the obstruction to the passage of the instrument indicates the point at which the canal terminates. When the pulp has been removed up to this point, even if some sensibility still remains, it is not necessary to go farther, and to this place the gold is to be carried in filling. It will, of course, be understood that the depth to which the instrument used has passed into the fang, must give assurance that the obstruction is near the extremity.

But it will often be found exceedingly difficult to determine with certainty whether a sensitive point touched by the instrument is a portion of the pulp still remaining in the fang or the part exterior to this. I am aware now that, sometimes, in the earlier part of my practice, I have inflicted severe and unnecessary pain in repeated attempts to remove what I supposed to

be some remaining portion of the pulp, when I was afterwards satisfied, that at every attempt thus made, my instrument passed entirely through the fang. This is more to be apprehended in the treatment of teeth in which the vitality of the pulp has been for sometime destroyed; and particularly so if they have been the seat of alveolar abscess. In such cases the canal of the fang and foramen are very often so much enlarged by absorption, as to admit the passage of quite a large sized instrument. In filling these fangs, Dr. Maynard tells me he is in the habit of measuring the length of the canal by using a fine instrument with the point bent at a right angle; this he passes up the root till it snaps over one edge of the foramen at the extremity of the fang, he then marks on his instrument the depth to which it has gone, and with another suitable instrument carries up the gold exactly to the end of the fang.

In cases where the pulp is not dead, and where there is no enlargement of the foramen, and there is but slight difference between its diameter and that of the canal, it is extremely difficult to know the proper point at which to stop, and the only means of which I know anything, and by which I am guided myself is merely an approximation. I judge from the depth my instrument has passed into the fang of its length, by comparing it with the average length of the fangs of teeth of the same class. It will be well for young practitioners who have not in their minds some adequate idea of the average length of the fangs of the teeth, to keep by them one or more of each class, and compare the length of these fangs with those under treatment. Although this is but an approximation to the desired knowledge, still it furnishes the means of operating with much more certainty than could otherwise be done, for although there is a difference between the length of the fangs of the teeth of the same class of different individuals, this difference is not so considerable, generally, as to make this method of ascertaining their length, entirely unavailable. And even if, occasionally, the length of the fang under treatment should be somewhat longer than it is supposed to be, it will be better to leave a minute portion of the pulp remaining in the extremity of the fang, than to run the risk of wounding the parts exterior to it.

During the process of removing the pulp, or after it is completed, some peridental inflammation is very likely to occur. I have found it much less apt to present itself since using the arsenious preparation in the manner I have described; and I am inclined to believe, from what I have observed, that a greater amount of peridental inflammation is likely to occur from rough attempts to remove the pulp without regard to the pain inflicted than from the effects of the arsenious acid. I have always, indeed, observed, that in those cases where most pain attended the removal of the pulp, most peridental inflammation followed. This inflammation of the membranes of the socket, for doubtless the living membrane of the alveolus from its contiguity is involved in the trouble, is indicated by tenderness to pressure, and this may vary in degree from slight inconvenience in mastication to severe pain from simple contact with the teeth of the opposite jaw, and even when no such cause as this gives rise to it, to severe and continued pain. Generally when the removal of the pulp is completed some slight inflammation will be present, and it will always be found advisable to wait till this subsides before proceeding with the operation. In most cases the inflammation which occurs will pass away spontaneously, but it may require treatment. It is always best to attend to it without delay, for although in the beginning simple measures will generally effectually arrest it, after it reaches a certain point it will in spite of all treatment run on to suppuration. It will generally be found that chloroform applied along the course of the fang on a small piece of cotton saturated with it, acting as a derivative and probably as a sedative, will effect all that is desired; but if this will not answer, the application of leeches to the part will generally have the desired effect. In using the chloroform, it is necessary to caution the patient not to use it too freely.

In one case in my hands, a lady of delicate habit declared that she was rendered insensible and quite sick afterward by the use of a very small quantity in the manner directed. I could scarcely credit the statement at the time—concluding that the quantity used was much greater than the lady was

aware of; but Dr. White has since informed me that he observed in his office, if I am not mistaken, a similar result from a very small quantity of the chloroform. I have made frequent use of it, however, many times with very happy results, and never in any other case met with such consequences.

Sometimes this inflammation of the membranes will continue for a considerable time, and it is best, except when the case is urgent, to wait, using, in the mean time, all appropriate remedies till this subsides, before filling the fang. I do not know that a disregard of this injunction would absolutely prevent the success of the operation, but it is certain that increased irritation, caused by the force necessarily used in filling would have a tendency to augment the inflammation of the parts, when they were already in an irritated and irritable condition.

But there is another reason why some interval should elapse after the pulp is removed before the fang is filled. Especially is this the case if the removal of the pulp has been rapidly accomplished. A quantity of blood has been regularly brought to the pulp, and when this part of the tooth is in healthy condition has been regularly returned to the system. The vessels bringing the blood into the fang are cut off, and there is an excess of blood which must be diverted to some other use, which is done by the adaptation of the surrounding vessels. Before this is perfectly accomplished, and before the excised vessels are perfectly healed, there will be a greater or less exudation of coagulable lymph, which, if not allowed to escape freely, must react upon the parts from which it has been thrown off, and thus cause trouble.

Nothing now remains to be done, after allowing sufficient time to elapse, with the assistance of proper remedies to get rid of any inflammation occurring about the parts, but to complete the operation by filling the fangs and the cavity or cavities in the crown of the tooth under treatment. This is a nice and delicate part of the process, often requiring the exercise of considerable ingenuity, and always demanding steady and patient manipulation on the part of the operator. This will form the subject of the next and concluding number of these papers.

ARTICLE II.

Opening Address, delivered before the American Society of Dental Surgeons at the Annual Meeting held in Philadelphia, August, 1851. By J. H. FOSTER, M. D.

"We are all grave, serious men, in our way; we think it our duty, as far as in us lies, to take care that the constitution receives no harm. To censure doctrines or facts, persons or things, which we do not like. If other people are not of our opinion we cannot help that. It were better they were."

ADDISON.

MR. PRESIDENT AND GENTLEMEN *of the American Society of Dental Surgeons*:—May I express the belief, that we have met here to-day, on this our 12th anniversary, with the ardent desire, one and all, to labor zealously for the community, strenuously for our friends, and sufficiently for ourselves. Let us endeavor so to apply ourselves, that, with God's blessing, we may have reason to felicitate each other, when our labors are closed, that our assembling together shall have been productive of more valuable information and matter conducive to the public weal, than we have realised from the past.

This is the second time you have entrusted to me the honorable and no less pleasurable task of presenting the Annual Address.

Would that I might render, in the performance of that duty, some adequate return, not an equivalent, by any means, but some compensation for the spirit of mutual confidence and trust, which, animating one side, ought, at the same time, to actuate the other to fulfil his obligations.

May I indulge the hope that the same feelings which induced you to bestow upon me that renewed flattering testimonial of your esteem, will induce you also to extend that charity and indulgence which a keen sense of my own insufficiency impels me to solicit.

Eloquent voices, inspired by the emotions which occasions like these are calculated to produce, might, from the fire of their own souls, enkindle in yours, that spirit of emulation, of zeal, of united and persevering effort, "in every good word and work," tending to increase and magnify the honor and usefulness of this body.

Distinguished members—there are among you, who might give utterance to words of wisdom, and by their reason and good sense, in earnest appeals to your judgment, succeed in determining you to new means and new measures, to insure peace, harmony, and happiness in our councils, and promote the best good of the profession.

Sir, it is impossible for us to be blind to the fact, that there have been periods of great anxiety, peril, and danger, in the history of this society; the causes have been too often reverted to, and are too well known to every member, who had any part or share in its establishment, to require their recapitulation. If we were to trace them to the original source, we should discover that there was one primary cause of all our difficulties and distractions, and we should concur in the opinion, that all the violence and intemperance, which have characterised its career, has been owing to the growth of party spirit, emanating from the vain attempt, to establish a society upon the broad basis of a liberal and unrestricted extension of universal fraternity.

It is not my intention, however, to enter into a discussion of these topics.

In regard to these, my opinions and views have been freely and sufficiently expressed. We were compelled to adopt the motto, "divide and conquer," to save ourselves from disgrace and defeat, nor do I believe that any thing else could have been done, any other course taken, by any or all the consistent members of this association, to avert the effect which such causes must of necessity have produced.

There is no longer the material or the question, out of which can emanate that spirit and intemperance of party, nor that determined and resolute advocacy of a particular system of mal-

practice and imposition, to be carried on by a minority of the members, under cover of the sanction, and in the name of this association, which the past has witnessed.

There is no longer the evil spirit of contending faction, led on by the black demon amalgam, to throw the fire-brands of discord and disunion into our ranks, but there may be, gentlemen, questions, points of order, other issues at stake, in your future deliberations, as there have been in the past, that will require all that discrimination, which, as thinking, reflecting, enlightened men, you can bring to aid you in the performance of your public professional duty, and in maintaining the high position for this society, which it was expected and designed to occupy.

It would be vain to arrogate to ourselves entire immunity from error—"to err is human," and from incidental causes, the action of association, as well as of the individual, may be affected in drawing conclusions from unfair or mistaken inferences, and though the verdict may be rendered in strict accordance with the evidence presented for our judgment, through a distorted view of facts, we may err in that judgment.

While, therefore, we are inclined to lean to the side of mercy, and are, perhaps, prone to exhibit leniency, when individual character and professional reputation are to be considered; let us be cautious to do no injustice to ourselves, and thus leave the profession and the community without those safeguards, which it was one object of this association to provide.

On the other hand let us be equally careful, in deciding weighty questions, that while we are firmly resolved to make no sacrifice of the eternal principles of "truth and justice;" but "to mete to every man his measure," that in relation to all matters involving uncertainty and doubt, and in which the evidence is not full, entire and satisfactory, the scale shall preponderate on the side of mercy.

Mr. President, what vicissitudes have we not experienced in the short period of our corporate existence. Twelve annual revolutions of the sun mark the age of this association; and, sir, I ask what have we accomplished, compared with what

we might have done, to advance the growth of science—to cultivate and improve our art, and enlarge our sphere of usefulness? We cannot shut our eyes to the truth, that in times past our best efforts have been counteracted by the adverse winds of faction. We must know and we do know, that the party spirit, to which I have alluded, has prevailed more or less, in all our deliberations. That heat and passion, engendered by the existence of this spirit, has mingled in our councils, and menaced the existence of this society, even after we thought we had exorcised it, and instead of uniting as one man to extinguish the flames, we seem to have been eager in searching for new fuel to feed this corroding fire, and in inventing compound blow-pipes, to concentrate this devouring, blasting, unsatiated element.

I come here, to-day, unable to utter one word upon any subject, other than this, for my thoughts would dwell upon no other, until the spirit of peace and fraternity had been invoked, to guide us in our future councils.

I implore all members who have come here this day, I entreat them by all that is dear to them in connection with this society, by all that they hope of good to be derived from it, and of good to be accomplished by it hereafter, to do all in their power to repress these passions, to look to its interests, to listen to the voice of reason, not as it shall be uttered by me, for I am not vain enough to indulge the expectation, that any thing I can say, will avert those evils; but to listen to their own reason—their own good sense—their own judgment in determining what is best to be done in the future, to accomplish its ends and objects.

Let us, as far as practicable, endeavor to accommodate and reconcile all questions of differences, upon which we may be unhappily divided, with a conviction of the intimate connection which exists between the individual members, who compose this body, and the body itself, and with a deep sense of the utter impossibility, that the body can ever accomplish any great or useful end, so long as its members continue to be at war one with another.

All adjustments, and all arrangements of controverted questions, may generally be successful and effectual, if both parties will make some concession, not of *principle* by any means—not of principle at all; (to use the language of our greatest statesmen,) "we stood firmly upon that platform once, and I trust we shall always stand there," but some concession of feeling and opinion, upon matters which do not involve any sacrifice of principle, may be sometimes made without individual loss or disparagement, for the "greatest good of the greatest number."

I do not intend, sir, to argue this or any other question at this time. I came here to express only opinions and impressions, and leave it to those who hear them, to debate the matter in their own minds, and draw their own conclusions.

We all know the great prominent substantial object for which this society was founded, and to the fulfilment of this purpose, let us direct our energies: let it be the leading and controlling idea: let us sink all secondary inferior considerations, to this primary, most important object. Looking anxiously at the true condition of things, and the nature, purposes, and ends for which we are convened and organized, let us act "*bona fide ad id finis*," in the fulfilment of all those obligations, which, as men of honor, we are pledged to hold sacred and binding, in supporting the constitution and laws, to which we have subscribed.

What are the subjects which most demand our serious consideration? How shall we best subserve the interests, and supply the wants of the profession and the community?

What measures shall we take to extend the means, for the largest increase of useful knowledge?

These and many other questions might be asked, which would consume all your time for many years, to think and act upon, and the answers to which, in the fund of information afforded, by the combined power of all your minds, might fill volumes, for those who are now looking to you for new light and revelation, establishing a sure foundation for those who come after you, upon which to build a superstructure, that shall redound to your honor and immortality.

There is nothing which so effectually represses all interest in, and desire of, associating with, this society, at the disposition evinced to waste time upon matters foreign to those which should engross our attention.

We meet together once every year for mutual improvement. The professed and avowed object is, to increase the general stock of knowledge, yet, a great portion of the time is passed in useless discussions; neglecting to avail ourselves of the light, now dawning everywhere, upon this great science, (for it is a science as much as astronomy, geology, or anything else,) we go away from our meetings with very little benefit, or improvement, compared with what might be obtained, if our proceedings were well ordered. Nothing in the world could do so much for the promotion of this great interest, as a *system* of education, aiming at a knowledge of the wants of the profession, and the means of supplying them, so that the material may be formed, to answer the increasing demand for good operators.

There are many who pursue the same course of practice, that others did forty years ago, and are content to do so. They do not aspire to any more knowledge than they already possess. "Where ignorance is bliss, it is folly to be wise."

Our duty is, to assist those who are seeking for information, and who will be benefited, if rightly instructed. Those who are impressed with an earnest conviction, that there is no goal in the acquisition of knowledge, that the field of scientific research is illimitable, boundless as the universe.

Let us do all in our power to strengthen those impressions, to fix indelibly these convictions upon the minds of those who are entering, or who have already made some progress, in the path of professional attainment.

Let them be made to understand, that the world is getting too practical to help drones and push them along, when there is a busy hive of workers.

The mind has a certain vegetative power which cannot be wholly idle. If it is not cultivated into a beautiful garden, it will, of itself, shoot up in weeds and flowers, of a wild and

noxious growth. This idea suggests to my mind the importance of paying more attention to DENTAL LITERATURE.

We are not a reading profession. Our students accomplish all that is required to secure their diplomas, and too often afterwards become mere *mechanical puppets.*

The string has been pulled, and the hands and fingers set in motion. They may perform their work well. But is this all there is to do? This all that is expected of him? Is it for this, and this only, they have read and studied? Is the pathological and physiological knowledge, which they have acquired, in your schools and colleges, to exert only a temporary influence upon their professional character? Have they not been taught, that this knowledge sustains an intimate and important relation in the sympathetic connection which exists between other organs in the human frame, and those to which their attention is more especially to be directed? Have they not genius and capacity? Have they not a laudable ambition to bring these faculties into active exercise? To extend their researches—expand their intellects—beautify and adorn their characters, not alone by exclusive devotion to dental literature, but by a general and select course of reading, which shall render them in scientific acquirement, in ability to impart pleasant and satisfactory information upon a variety of topics, ornaments to society, as well as to the profession? We need more *educated* men! We need them in *society*, for, ever since *literary* men have entered upon this field of labor, the distinction has been in *their* favor, and they have assumed the higher social position, which learning, combined with practical skill, entitles them to occupy. We need them in the *profession* to give greater *character* and *influence* to its increasing importance. We need them as *editors* to some of our public journals, as well as *contributors.*

This profession claims the strictest alliance with the cause of humanity, it proffers substantial blessings to man. It has an extensive scope; it investigates the structure of that beautiful mechanism, which God has given us for a most useful purpose. It searches and examines into the laws of its vital

movements, both in health and disease, and their sympathetic connection with the whole animal economy. It contemplated a great variety of influences, by which its complicated processes of development, (too generally prone to a morbid character and action,) are accelerated, retarded, suspended, or destroyed, and therefore to shield society from the pain and suffering, which ignorance, or custom, or recklessness, may entail upon it, do we especially need *educated men.*

Let, then, our societies, colleges, and private schools of instruction, be impressed with the weighty responsibility resting upon them, with the due importance of inculcating a more continued and unwearied application in the pursuit of knowledge, upon the part of those who are just entering upon their probation.

Students must labor long and earnestly before they can realise how much there is to be accomplished in obtaining all that is intrinsically important to fit them for practice, and that in a whole life time of application to this end, they will have gathered comparatively little of the accumulated amount of useful, revealed, as well as yet undiscovered treasures, which are to be extracted from the vast store house of knowledge, the doors of which are always open to the votaries of true science.

Let them study all the duties they owe, in the largest sense, to the communities with whom they live and labor.

Let them be able to explain the mechanism of the physical organization of the teeth, and more than this, to expound, so far as known, the beautiful and harmonious laws enstamped upon the whole organization of the human frame, by which its complicated movements, and diversified phenomena are sustained. Laws as immutable in their nature, and inflexible in their operations, as those which hold the planetary system in their order. Let them in literary attainment, in scientific research, fit themselves to instruct, and even should they never be called to fill public places as teachers, they will find opportunities in every day life, to avail themselves of their advantages, to their own advancement and usefulness, and the good and happiness of all around them. No man I believe was ever

yet conscious of possessing too much knowledge of a useful character. How many have to mourn over their deficiency in this particular, and how many, alas, deeply sensible, that through their own neglect they have lost the opportunities, which might have fitted them to occupy stations of greater honor, confidence and trust.

"Richard Burke being found in a reverie, shortly after an extraordinary display of powers in the House of Commons, by his brother Edmund, and questioned as to the cause, replied, I have been wondering how Ned has contrived to monopolize all the talents of the family; but then, again, I remember when we were at *play*, he was always at *work*. The force of this anecdote, is increased by the fact, that Richard Burke was considered not inferior in natural talents to his brother: yet the one rose to greatness, while the other died comparatively obscure." Trust not to your genius, young man, if you would rise, but *work! work! work!*

Let your pupils comprehend, too, that they are not to be servile imitators of any man's operations, that they themselves have inventive faculties, and that those faculties must be cultivated, that they, too, may furnish their quota, to the great treasury, into which so many in this "golden age," are pouring almost exhaustless contributions of individual enterprise and skill.

My greatest fear, I must confess, is, that the rules and requirements for the admission of candidates into our schools and colleges, are not sufficiently exacting, or not rigidly enforced; that too often students have been matriculated, without having received such a preparatory education, as would enable them rightly to improve the advantages, which they expected to derive from a course of instruction.

Notwithstanding our rapid advance in theoretical and practical knowledge, it appears to me, as if our profession, as its numbers increase, is becoming in a greater ratio, more and more mechanical.

To what is this to be attributed? To the great improvements which have taken place in the manufacture of mineral teeth,

and in the adaptation of plates. Many operators are too ready to condemn *natural teeth*, which might be made useful and serviceable for many years, because it is easier to insert artificial ones, or because they are unwilling, or *unable* to perform those elaborate and intricate operations, which are essential to their preservation. The operation of the excision of the nerve, and the filling of teeth into the fangs, might be performed successfully in thousands of cases every year, in which, through ignorance, or culpable advice, such teeth are sacrificed, and the patient is induced to believe that a mineral appendage, is a more ornamental, if not useful substitute.

Let those who show a particular devotedness to, and the greatest proficiency in, the operation of *filling teeth*, be impressed above all with the conviction, that those who are attaining pre-eminent rank and reputation at the present day, are those who are performing new and untried operations.

Let them attempt, and persevere in their efforts by repeated trials and experiments, to effect success in filling the largest and most difficult cavities with *gold*, even in cases in which success is almost considered hopeless.

Let them be encouraged by the reflection, that one operation of such a character, one cavity filled which contains ten or twelve sheets of *gold foil*, *one tooth saved*, under such circumstances, by a patient and laborious expenditure of time and talent, *will*, though it may not manifest itself for many years, *eventually* do more, if perseveringly continued in, to establish a reputation for superior practical skill, than the *ninety and nine* ordinary operations in the hundred.

But to the accomplishment of this end, there must be an entire conviction of the truth of this proposition.

There must be a will strong enough to overcome, and capable of subduing any and every opposition of the mind, and compelling its assent. There must be no "halting between two opinions."—There must be no doubts or misgivings, no debate or inquiry, whether some other *course* might not be pursued, some more plastic, less expensive *material* used. The mind must be satisfied upon this point, in a manner to

leave no room to doubt before the work is commenced, or it will never be finished as it should be. The full gratification which results from the ambition and desire, to accomplish a fixed purpose and end, will never be realized, except the whole heart and soul are enlisted and engaged in the object to be accomplished.

These operations require a continued, constant, unwearied application of mind and body.

It is this which renders success so extremely difficult to be attained—this that makes it such hard labor, that few are willing to continue steadfast to the end—this reaching, anxious exercise, of reason, reflection and judgment—this intense study and application to accomplish, what the man, who has not experienced it, has no adequate conception of, and fails to comprehend—this, that sometimes occupies the mind by night as well as by day, and which the poet has so vividly portrayed, that the artist at once realizes the picture :

> "The thoughts that bear me company the livelong day,
> Through my thin sleep look in upon me still,
> And yet methinks the darkness seems to bring
> Light of its own ; for waking oftentimes,
> In the dead lonely hush, the painted world
> I labor in by day, starts suddenly
> On the dark void, as if a master hand
> Stamped it upon the curtain of the night ;
> And parts that many an hour I've wearied o'er,
> Often effaced, and vainly still renewed,
> Arrange themselves in shapes of wondrous power ;
> Then I lie tossing, wearying for the sun,
> That I may haste to fix them here forever."

To continue this subject yet a little farther, it is our duty, also, to warn those who are possessed of superior talent, and are striving to climb the rough ascent to popular distinction and eminence, as well as to fortune, that it is a hard hill to climb, there are a great many slippery places, a great many opposing obstacles, and inducements to turn to the right or to the left, to look for some easier, readier way to reach the summit, instead of following the straight and narrow path, by which alone they can ever attain the realization of their hopes

and desires. The majority of those who start upon their professional career, do so with the expectation, and intention of doing all that in them lies to make the most money in the shortest possible time. This is not the way to attain eminent rank and high station.

They should look to a proper performance of all their operations, to their improvement in these, and should strive to the utmost extent to multiply the more difficult evidences of their skill, and that too for many years, without regard to any immediate appreciation of their works, or adequate remuneration for their services. They cannot know themselves, what is the true value and price of their labor until time has proved it. But they will find eventually, after a lapse of many years it may be, that if they have been successful in those cases which have cost them the greatest amount of time and labor to execute, they will be repaid an hundred fold.

"The bread which has been cast upon the waters will return to them;" and "as they have sown so will they reap fame, fortune, honor, and in addition to these, the happiness of a mind at peace with itself, and the gratitude of those who will cherish their memory with fond recollection, when from age or infirmity they are no longer able to minister to the suffering, or when they shall have passed away from the scene of their labors upon earth," and the "places which have known them, shall know them no more forever." How dear to every heart, how prized above all price should be this reflection. That our memories shall be cherished here upon earth for the *good deeds* we have done, when we are no more.

I hardly know of two words in the wide range of our language which combine to express more lively emotions, more heart stirring and exalting pathos, than the simple phrase, "Remember me."

It forms a golden chain of love and memory, that connects the present to the unforgotten past, along whose shining links is conveyed, all that we have ever known or felt, or enjoyed in life's toilsome journey. Neither time with its wasting hand, nor separation from the scenes of childhood, and early man-

hood, and more than all from the loved ones, that were all the great world to us then, can ever efface from memory's faithful tablet, those two words so deeply engraved thereon.

All the life, and the thousand hallowed associations connected with it, are recorded in that simple phrase, "Remember me."

And do we not all feel in our inmost hearts the strong, ardent, burning desire, that our memory shall be cherished, when we are absent from loved friends, that we shall not be entirely forgotten, when we shall have taken our final departure, "to that bourne from whence no traveller returns."

Is not this thought an incentive to a life of well doing, to a self-sacrificing, self-devoting interest in the cause of humanity.

Do we not realize that the spell which hangs around those two simple words is a spell to win us from the path of error, to animate us, to impel us (even if there was no higher, holier incentive to lead a good life) to renewed exertion, so that we may leave behind us a large circle of grateful friends, whose regard, veneration, and long cherished love for our memory will be a prouder monument than sculptured tomb or marble mausoleum?

I have endeavored to impress upon you the need there is for greater zeal and activity in the pursuit of knowledge, and its promulgation.

I do not wish to detract in the least, from the merit of those who have striven hard for the last twenty or forty years to the accomplishment of this end. I do not undervalue the good which has been done.

Our colleges have accomplished much, *very much* to advance the character and respectability of the profession. We *need* public schools, colleges, and educated instructors. The superficial knowledge, often worse than none, too generally obtained by passing a few months in the office of some obscure practitioner cannot fit men for practice. We owe to those who have supplied this demand at great personal sacrifice, and often at pecuniary loss, our meed of thanks. I do not believe that in any private school in the land, and with the best practitioner

in the profession, a student can be enabled to acquire the same extended information, equal advantages, or general fitness, to commence the practice of his profession that he is able to acquire in some of our colleges. And why? Because practitioners of ability and eminence, have such a requisition made upon them for their services, such a continual demand to answer the calls for their professional aid and assistance, that they cannot find the time to devote to this purpose.

The editor of one of our public journals, in animadverting upon some remarks of mine upon this subject, which were published a few years since, "*indirectly and negatively, if not directly and positively,*" lent his influence to justify charlatanism, by advancing the plea, that the charges of eminent practitioners were so exorbitantly high, that pupils had been *forced* to enter the offices of men who were not so well qualified as instructors.

I will quote his own language upon that point, to show the utter inconsistency of his argument; the radical spirit with which the leading articles of that journal have been too often imbued, *unimportant*, only that such doctrines sometimes exert a pernicious influence and tendency upon those who are entering the profession. The reasoning, reflecting mind, can see the incongruity of such ideas at once, and it needs only a common sense view of the question to be convinced how much of conformity to fact, or reality, it is deficient in. It speaks for itself; it needs no argument to prove its absurdity.

He says, "That there is much truth in these alleged causes of superficial education, and consequent bad practice among dentists, we freely admit; but we apprehend that if all the causes were examined and exposed, it would be found, that some of these very liberal minded men, whom Dr. Foster so much delights to honor, have indirectly and negatively, if not directly and positively, lent their influence to produce this very imperfection in dental education."

"Twenty-five or thirty years since, the success of a few eminent dentists in this country, drew public attention to the importance of operations upon the mouth, for the better preservation of natural teeth, as well as repairing their loss by artificial means."

"The demand was then great for skillful and scientific dentists, and yet the terms for tuition were so exorbitantly high, as to preclude the possibility of many, who would gladly have availed themselves of their instruction, from doing so. From one hundred to one thousand dollars was

frequently asked for instructing students in dental surgery. The consequence was, that but few could afford to pay for their instruction, and were forced to enter the offices of men who were less qualified to instruct, or commence without any instruction at all, and trust to subsequent observation and experience to perfect them in their operations." "Young dentists," he added, "were watched with a most jealous eye. If one entered their office, he was regarded as a spy, and if he asked any questions relating to practice, he received only evasive answers." And then publishes the following note, taken, as he says, from Mr. L. S. Parmly's Lectures, published in 1820, soon after his return from Europe, and very unjustly censures him for rating his services so high. "Mr. Parmly, being desirous that his peculiar treatment of the teeth, his operations, and general views upon the subject, should be as widely diffused as possible, for the common benefit of society, undertakes to qualify gentlemen of liberal education, for practice, as dentists, on the following terms: For practice in London, $1,000. In any other city of Great Britain or America, $700. For foreign practice, $500. These terms apply solely to a finished course of instruction, including every particular of the art with which he is acquainted."

Now, I would ask any candid liberal minded man in the profession, or out of it, considering the great demand there was at that period, 1820, for well educated men in the profession, and the value of time to those who were engaged in it, in answering the demand made for their aid and assistance, and also the large field there was, in which all who were properly and thoroughly instructed in the principles of practice, might enter with the absolute certainty of reaping a rich and abundant harvest, whether $500, or $700, or $1,000, should be considered "*so exorbitantly high?*" Would not any man possessing that amount of capital, invest it at once in any other business in which he would feel as certain of realising a rich return? Again, who among you, in full practice now, has hours entirely occupied with professional labor, could afford to appropriate that portion of time, which, in justice to a pupil, he would feel obligated to do, if he performed his duty, ***his whole duty***, to that pupil so as to fit him to act well his part, that could afford to do it, for a less sum, than the ***highest price*** which has been quoted; with the advantages offered for instruction in our colleges, I cannot see, amongst dentists ***in full practice***, how any could conscientiously discharge his duties as an operator, and devote as much time to the private instruction of pupils also, as would be indispensably necessary to enable them to compete in all requisite qualifications with the

graduates of our colleges, without manifest detriment to himself, in a pecuniary point of view, at anything like the ordinary prices of a collegiate course of education.

In view of the great and increasing demand there is for good and efficient operators, the profession and the community have alike reason to rejoice, that men have been found both able and willing to become public instructors, and take this heavy responsibility upon themselves.

To return from this digression, I would like to be informed, how young men were "forced," because they had not the *means to pay*, for the best instruction, were "*forced*" to go to those who were practicing without knowledge, or (utter absurdity) "*commence without any instruction at all, and trust to subsequent observation and experience to perfect them in their operations?*" Forced, forsooth! they had much better be "hewers of wood, and drawers of water," than hewers and drawers of teeth, and would then be *honored* in their occupation.

Could they not have embarked in some honest calling, and industriously have pursued it, until they had *acquired* the means of paying for a knowledge of the profession they desired to adopt?

Instances are related of dentists who have entered the offices of distinguished operators, without a proper introduction, in doing which, they were *very justly* regarded, in the light our artiste editor alludes to.

It is customary when an application is made for our services, to record the name of the applicant, and if one claiming to be a member of the profession, enters the office of an eminent dentist with a friend, who is to be the patient, and watches the manner and method of conducting an operation, or becomes himself the patient, without disclosing his name and occupation, the mildest appellation that could be applied to him, would be a "*spy.*"

I do not believe that a dentist of good standing, who had just claims to be considered within the pale of the profession, should enter the door of any of "those liberal minded men,"

to whom this gentleman alluded, ***declare his name and business***, as every high minded, honest man would, and ask for information, or professional aid, without its being cheerfully rendered.

Those only are likely to be watched with "*jealous eyes*," and receive "*evasiv eanswers*" whose lion skin is not sufficiently ample to cover up those long ears, by which the true asinine species is so easily recognised, and

> "Who compound for sins they are inclined to,
> By damning those they have no mind to."

My object in dwelling upon this point at such length is, to show that there are men claiming to be considered the exponents and propounders of professional rules and orders, who are disposed to cavil at the fees which eminent men in the profession are justly entitled to.

If they demand and receive such a price for their time and talents, as they value them at, from those who rightly estimate their worth, must they be *compelled* to make a great personal sacrifice, to meet the wants and circumstances of others, who, because they have not the capital to invest, would insist upon their right of possession on more liberal terms.

Is not knowledge *property* ? Does not he who possesses it hold a legal title, and right of ownership, and the power of disposing of it, to make profit by it, at his own valuation ? Have others the right to dictate, or to demand that it shall be transferred to them, for a minor consideration, or failing in this, to seek its attainment surreptitiously ?

Has not he who has attained wisdom, paid a price for it, labored harder for it, than those who dug in the bowels of the earth for gold, or dive into the caverns of the deep after pearls ? Is he who possesses the greatest treasure, the largest stock of knowledge, incapable of estimating the true worth of it ? And if he does not feel inclined to dispose of it to those who feel their own deficiency and barrenness, at their low estimate of its value, are they to be justified in ***stealing it*** ?

No one is under *obligations* to pay to the best instructors, the high prices demanded. An applicant may pay whatever he

chooses elsewhere. If *he* decides, that he can obtain all the knowledge he requires for a picayune, why that will be its cost to him; let him pay it, and no grumbling. His patients will most likely, be the only fault finders.

If, on the other hand, those perfectly able to pay, who choose to invest their capital in buying professional stock, shall see fit to consider, that it does *make some difference*, where and how they invest it, and prefer to buy all the knowledge they can, and expend thousands for it, whose business is it but their own. Who should cavil if they are satisfied? Who that has paid the largest sums for instruction, would not now willingly pay ten times the amount, rather than be compelled to practice this profession, with any diminution of his intellectual, physical, or mechanical acquirements and resources? Knowledge, is our most available and reliable operative agent, the only sure guide that can conduct in the way of well-doing, that can lead and support us up the slippery ascent, which we must climb, before we can reach the goal of our earnest hopes and honorable desires.

It matters not in what business or profession men may engage, they must take rank relatively, according to their knowledge, talents, and genius. They cannot continue on an equality, one will invariably precede another, according to his ability in using the gifts and advantages, which his own exertions have secured to him, in addition to those with which GOD has endowed him.

Energy is the true mark of genius. In the present day of steam accelerating advancement, and rapid movement, the lazy man, no matter how extraordinary his acquirement, must always fall behind in the race.

Emerson, in one of his lectures, traces, with the clear sweep of an artist, the vital necessity of energy and labor, to even the most gifted.

He says—"Genius unexerted is no more genius than a bushel of acorns in a forest of oaks. There may be epic in men's brains just as there are oaks in acorns, but the tree and the book must come out before we can measure them. There

is a large class of grumblers and wishers who spend their time in longing to be higher than they are, while they should be employed in advancing themselves. These bitterly moralize upon the injustice of society.

Do they want a change? Let them change—who prevents them? If you are as high as your faculties will permit you to rise in the scale of society, why should you complain of men? It is God that arranged the law of precedence. Implead Him or be silent! If you have capacity for a higher station, take it—what hinders you? How many men would love to go to sleep, and wake up Rothschilds or Astors?

How many men would fain go to bed dunces, to be waked up Solomons. A man of mere "capacity undeveloped," is only an organized day-dream with a skim on it. A flint and a genius that will not strike fire, are no better than wet junk wood. We have scripture for it, that a "living dog is better than a dead lion." If you would go up, *go*—if you would be seen, *shine*.

At the present day, eminent position in any profession is the result of hard, unwearied labor. Men can no longer fly at one dash into eminent position. They have got to hammer it out by steady and rugged blows. The world is no longer clay, but rather iron, in the hands of its workers.

We do most earnestly assert the rights of genius and talent to such remuneration as their services will fairly command.

Arkwright's, Watt's, Whitney's, Fulton's, and a great many other beneficent inventor's achievements, either enriched them, or should have done so.

Every one is entitled to receive whatever he or she may fairly earn. If the lovers of music choose to pay the greatest living singer, one thousand or even ten thousand dollars per night; who shall say, that sum is not fairly hers? Just as clearly as any one of our eminent lecturers, is entitled to the fifty or one hundred dollars, which the people of some village or city choose to pay him for his services.

Let not those whose living comes by their own exertions disparage the claims of eminence, *fairly earned*, to its full and ungrudged recompense.

I wish briefly to allude to one other topic, which is of sufficient importance to receive more attention; but, that I have already extended this address to an undue length. It is the system of advertising. There are three modes, all equally demeaning and undignified in a professional man, though, probably, not altogether unprofitable, since they are still resorted to in various sections of the country, though not to so great an extent as in former days.

Self-laudatory advertisements, with a long array of names and recommendations published in the daily papers, is the most general mode. Next, the publication of small journals and tracts, or treatises on subjects pertaining to the teeth issued by a private individual, and distributed at every body's door, like a whitewasher's or carpet shaker's card for the public benefit. If these could be enlightened, and have the prayer answered, "O that the laird the giftie gi'e us, to see ourselv's as ithers see us," they would realise the ridicule which attaches to them, as well as the mortification which we feel, when our patients come to us, and say: Here, doctor, we have received another begging invitation from one of *your professional brethren*, and were *reminded* of you again. Lastly, the publication of indecent dissertations, and disgusting details in some of our literary weekly journals, upon matters, which every patient who employs an efficient and skilful dentist is informed of, when his or her *necessities* require it, and which should never appear in print, except in journals, especially devoted to such purposes.

I beseech you my friends to endeavor to impress upon all, who are within your reach, over whom you can exert any degree of influence—and who are worth the effort, the folly of advertising in any of these forms.

It will not increase the business of good operators to resort to these means of obtaining practice. It cannot take away from the business of other good operators, if some do resort to it.

The only class who may reap a scanty pittance thereby, are the uneducated, the unfitted, whose only hope lies in securing

an unweary straggler now and then, whose eye is caught by that ever glittering, but brazen sentence: "The best operations performed at the following reduced prices, and *warranted.*"

Let this aphorism impress all who have any feelings of professional pride, and who are inclined to sacrifice them on the altar of their necessity, vanity or ambition.

"Be particularly careful not to speak of yourself when you can help it. The less you say of yourself, the more the world will give you credit for."

Whatever perfections you may have, be assured people will find them out; but whether they do or not, nobody will take them upon your word.

True genius is ever modest.

The masses of our people have a mind of their own, which is not so easily perverted as empirics, and mere panderers after popularity think it; an intelligence sufficient in its practical application, to guard them against the mischievous expedients of charlatans and demagogues, who vainly seek to practice upon their sympathy and credulity, to advance selfish ends.

The advertising fever which has been stirred up in this country by the Crawcours, Malans, and some of their followers, has abated somewhat of its malignant character, from which we are prone to deduce some wholesome conclusions, and we shall see more and more clearly, how ephemeral its effect is. It is as idle as the wind. A mere ripple on the surface making no lasting impression—a mark in the sands on the great sea shore of public opinion, which the waves of reason and reflection will soon have swept away.

My purpose has been to endeavor to impress you with a due sense of the importance of a life of industry.

It is the alpha and omega of this exhortation, and, in concluding, I would again urge you to more strenuous, self-sacrificing, self-devoting labor and zeal in your profession.

Honest industry will secure the esteem of the wise and the good, will yield the rich fruit of an easy conscience, and ensure that hearty self-respect which is above all price. Counsel all young men that they may be incited by words to good deeds.

To be diligent in business—to cultivate and improve the heart and the mind, that they may command the confidence and respect of those, whose respect is worth an effort to obtain.

Success may be slow at first, the more slow from a firm adherance to the principles of truth and justice, but none the less sure.

There will be many struggles, discouragements, disappointments, temptations, and trials of faith, constancy, honesty, firmness of purpose, stability of character, powers of endurance, which all, in the commencement of their career, have had some experience of.

There are times when heaviness comes over the heart, and we feel as if there was no hope, no inducement to exertion. Who has not felt it? For this there is no cure but *work.* Plunge into it—put all your energies in motion, rouse up the inner man—*act*—and this heaviness shall disappear as mist before the morning sun.

There arise doubts in the human mind that wrap us in gloom, and make us think it were bootless to attempt anything. Who has not experienced them? Work—that is the cure. Task your intellect—stir up your feelings—rouse the soul—and these doubts, hanging like a heavy cloud upon the mountain, will scatter and disappear, and leave you in sunshine and open day.

There comes suspicion to the best of men, and fears about the holiest efforts and we stand like one chained.

Who has not felt it? *Work.* Therein is freedom. By night, by day, in season and out of season, work, and liberty will be yours. Put in requisition mind and body, war with inertness, snap the chain-link of selfishness, stand up as a defender of the right; be yourself, and this suspicion, and these fears, will be lulled, and like the ocean storm, you will be purified by the contest, and able to bear and breast any burden of human ill.

Gladden life with its sunniest features, and gloss it over with its richest hues, and it becomes a poor and painted thing, if there be in it no toil, no hearty hard work. The laborer sighs for repose. Where is it? What is it? Friend, whoever thou

art, know it is to be found alone in work. No good, no greatness, no progress is gained without it; work, then, and faint not, for therein is the well-spring of human hope and human happiness.

NOTE.—Since this address was delivered, a controversy has been started upon the subject of establishing Dental Chairs in Medical Colleges. The advocates of this experiment contend that superior advantages will be thus offered for the education of dental practitioners. Some have gone so far as to express the belief, that there is an absolute necessity for it. They contend that the course of instruction pursued in dental colleges is deficient in many important particulars, that they do not combine all the essential elements, so connected as to create a fundamental basis, that can serve as the ground work of a system of correct practice. There can be no doubt, that the appointment of a dental professor in every medical school in the country would exert a salutary influence in awakening public attention, by and through the aid of the great body of medical men, whose interest would be secured to the intimate relation which this specialty holds and exerts upon all the other departments of medical science. It would also have the effect to incite our dental colleges, to endeavor to supply deficiencies in their organization, if they are imperfect, and thus secure a more complete and effectual system.

But that a medical school, with one dental chair only, even if that chair be occupied by the best man who could be appointed to fill it, can ever be successful in making efficient *dental operators*, is an imaginary hypothesis. Other advantages must be combined therewith, to render such a scheme either feasible or practicable. And what! Thorough practical instruction in some private office, by a *competent* teacher, not for two or three *months*, but for as many years. The question then arises, will the most eminent men in the profession, with a self-sacrificing spirit, from motives of disinterested benevolence, and pure philanthropy, *give* their time and attention to as many pupils, as each would have apportioned to him, if the call of good operators, which the great increase of dental disease in this country demands, is to be answered in this way? I think not. It would be almost equivalent to a *free gift*, if they should consent to receive students, on as liberal terms as those which dental colleges offer. So long as dental colleges continue to exist, and to hold out the same inducements which they now do, will applicants consent to pay eminent private teachers, the *value* of their time and services, besides being subjected to the increased additional expense for attending full courses of lectures in a medical college? I would not be understood as intending to decry, or undervalue the utility of a thorough and complete knowledge of medicine and surgery in all its branches, to him who devotes himself to our particular specialty, the *advantages* are indisputable.

But as we cannot induce candidates to adopt our mode of thinking, and there are no laws to restrict them; let us do the best we can for them. Dr. Westcott's very able article recently published in the New York Medical Review, presents very strong and forcible reasons, why dental colleges should receive the continued countenance and support of the profession.

If they are not in all respects what they should be, they may be improved.

Let their requisitions be more imperative.

Let them increase the needed and essential qualifications for admission as well as for graduation. Let them extend the required term of study. Let them enforce all their laws and regulations, rules and orders, strictly to the letter.

Their doors have been freely opened to the profession, and their claims to respect and encouragement if freely canvassed, should be as fairly and considerately judged. Suppose there are, as there may be, each year, some who seemingly have their degrees conferred upon them, before they are qualified to be admitted to practice, in the strict acceptation of the term. May not the same be said of the graduating class of every medical school in the land? Of every classical school? Of every college? Are *private schools*, with the *best instructors*, an exception? Are their pupils, after a three years term, supposing them all to have pursued industriously and laboriously the duties required of them, are they all *equally* competent *to fill high places*? And is it right, is it just, is it reasonable to denounce and condemn dental colleges because *they* are not immaculate?

What state of mind, or of the affections is there, whether desired or deprecated, that may not minister to our annoyance, if that pure principle which brings satisfaction and strength, and harmony, to the soul, be wanting?

Mediocrity of talent, failure in a profession, is commonly considered as an occasion for intolerable disquietude; but inferiority itself is not more agitating than the situation of a proud man, exalted in the public opinion and obliged to satisfy the demands made upon an idolized reputation.

"What shadows we are, and what shadows we pursue." Ambition, sees more than it can gain; discouragement sees nothing that it can gain.

ARTICLE III.

The Relation of Tic Douloureux to Disorders of the Teeth. By TOOGOOD DOWNING, M. D. *Author of the Jacksonian Prize Essays of the Royal College of Surgeons, on Neuralgia, its various Forms, Pathology and Treatment.*

A FEW words of explanation may be advantageously premised, in order to start fair with the readers of a journal, who, we may presume, are chiefly of the dental profession, lest it be imagined that I am invading their province, and travelling into regions beyond my ken. *Ne sutor ultra crepidam*, I consider a very good axiom, and am, therefore, far from aspiring to be that unpopular Crispin who requires to be continually reminded, "that he should stick to his last."

For the dentists of the present day—I speak of course only of the best class—I entertain feelings of brotherly respect. They are not now mere tooth-drawers, or ignorant vendors of tooth powders and nostrums, as they were formerly styled with great show of reason; but men of education and character, who bring to bear upon their department of the healing art, their specialty, the general principles of medicine and surgery. Some we know are excellent physiologists who take enlarged views of things, and aid, by researches in their particular department the onward progress of science. Observations, such as the following, may be addressed to them without fear of giving offence, as they are conceived in the spirit of kindness and good fellowship—certainly, with no wish to depreciate them in their own eyes, or in those of the public. The entire profession, in my opinion, should be bound together in the closest bonds of union. The links of the chain, such as where the different departments come in contact, are always the weakest; and it is in order to strengthen these salient points that my present endeavor is directed.

My object is to draw particular attention to the sympathy subsisting between the nerves of the teeth, and those of the

body in general, and the tendency of certain operations of the dentist to their disturbance; the derangement often caused in some conditions of health, by the mechanical appliances of artificial teeth, pivoting and stopping, and the injury accruing from the thoughtless and unnecessary extraction of sound and healthy members for the relief of painful conditions. The extent to which this latter practice is carried by, we may suppose, the more youthful and inexperienced members of the profession is almost incredible; and, therefore, we endeavor with candor to educe the laws which should regulate their proceedings in this particular. The efforts of art should be constantly directed rather to save than to destroy. Modern science fully recognises this principle. Sometime back, the surgeon made his boast and glory of the number of limbs he had amputated. Now, with more enlightened views, he justly prides himself upon the number he has saved. So should the dentist of the present day take credit, rather for the teeth he has preserved by judicious management, than for the hosts he has extracted by the most skillful and scientific wielding of the key or forceps In the course of my investigations into the nature and causes of neuralgic affections, this subject has been forcibly impressed upon my attention. I lay no claim to original views or discoveries in the matter. Many passing allusions to it are scattered through various writers, both medical and dental. I would wish merely to collect and reiterate these, and thus impress certain truths which are too often forgotten or disregarded.

Anatomy teaches us that the dental branches are supplied by the second and third divisions of the fifth pair of nerves, filaments of great tenuity, which enter at the fang and form the pulp in the interior. Upon their intimate organization, it is unnecessary to dwell, or their special purpose in the animal economy. They form part of the system of facial nerves, and are, therefore, subject to the same laws of subsistence and disturbance as those with which they are associated. On this point, there can scarcely be a difference of opinion. That they are of the sensitive kind most persons have been painfully re-

minded. It seems probable, that there is no admixture of motor fibrils in their composition, as is the case with other portions of the trifacial; but the presence of sympathetic filaments may be assumed both from the proximity of ganglia and the organic changes that take place; as a part of the nervous system of the face, the dental twigs are subject to certain painful disorders, which may either originate in themselves, or be conveyed to them from the adjoining branches. They may also arise from sympathy with distant organs or metastasis from them. This is familiar enough under the title of tooth-ache. But it is quite unnecessary for me to state that odontalgia is not the same disease under all circumstances. The character and nature of the pain varies in different instances as well as the pathological condition on which it depends. Thus, there may be inflammatory or rheumatic tooth-ache arising from inflammation or rheumatism of the odontoid nerves, and it is equally certain, that they may be afflicted with that agonizing disorder, known as tic-douloureux. As it is their relation to the latter malady, that I now more particularly wish to dwell upon, some of the characteristic features of the dis orders will be described, as I shall then be able to show the conditions under which the teeth become involved, either as a cause or effect of the complaint. Having so recently written largely on the subject, I should wish to compress my remarks into a very limited compass, as nothing is so "tedious as a twice told tale."

Neuralgia, as its name implies, is a painful affection of a nerve, consisting of a morbid exaltation of sensibility without organic change; a violent thrilling agony, compared by the sufferer to the shocks of an electric battery, occurring in paroxysms with more or less perfect intermission. It is not confined to any one part of the body, but may be seated in any portion of the system, wherever in fact the nerves are distributed. Thus it may occupy a position of the upper or lower extremity, or be placed in the head, chest or abdomen. Although, from causes which will be afterwards specified, its ravages are chiefly confined to the surface, yet physicians of

the present day assign it a place among the affections of the internal organs, where it is equally characterised by violent intermittent suffering, which may continue for years without leaving a trace of organic disease after death.

Neuralgia, although sometimes erratic, is generally confined to distinct sets of nerves. Many of these forms, as they are called, have been distinguished by specific titles and regarded as distinct diseases. Such, for instance, as sciatica, where the chief nerve of the leg is implicated; hepatologia, or nephralgia, where those of the liver and kidney are affected, and tic douloureux when confined to the cheek. But the disorder is essentially the same wherever it is situated, however much the phenomena may be modified by local causes. These specific names are, therefore, retained more by the public than the sanction of the medical profession, as the object of all true science is to generalize, and such nomenclature is calculated to lead to erroneous notions of the pathology. When I say, however, that the disorder is essentially the same, I would wish to impose certain limitations to this expression. I distinguish three kinds, or varieties, of neuralgia—the spasmodic, the rheumatic, and the hysterical. Any nerve of the body may be affected with either of these disorders, but the painful derangement is of one or the other species.

It would be extremely interesting to know the exact nature of these nervous pains—the peculiar condition of the fibrils on which the impression depends. The mind of man is inquisitive; some portion of that which is considered woman's foible enters into his composition. He finds a satisfaction, a glow of pleasure in unravelling the secret mysteries of nature, as expressed by the poet—*Felix qui potint rerum cognoscere causes.*

In cases like the present, this propensity may be rationally and advantageously indulged. The talents and industry of man can never be better employed than in seeking to discover the sources of the trouble to which his species is condemned, and the only regret is, that in his most legitimate pursuits, he should so often be disappointed. Nothing positive is known on the subject. The physiology of the nervous system is very im-

perfectly understood, and hence its pathology can scarcely be satisfactorily elucidated. If we know not the nature and nerve of action of the *vis nervosi*—while it is still undetermined whether it be a circulating fluid—a refinement of galvanic electricity coming through its fibres in the same way as blood traverses the veins and arteries—or a vibratile or molicular motion of its organic elements, we must remain in the dark as to its derangements and disturbances. Researches by the scalpel afford no clue except by their negative nature. It is true that certain morbid appearances, such as hardening, or softening, thickening, or atrophy, of the nerves affected with neuralgia, have been sometimes discovered after death; but these are opposed by the numerous examples where the tic douloureux had existed for a length of time without leaving the slightest trace of organic change. The most careful examinations by excellent anatomists have failed in elucidating anything abnormal. The nerve affected has been apparently in as sound condition as its fellow of the opposite side. Hence we may infer that hyperæmia, anæmia, &c., are not essential to the disorder, but are mere accessories to it, either before or after the fact. If organic changes were essential, it would be invariably present. Hence we may discard the theories of neuralgia depending upon inflammation, or acrid matter, cancer, &c., and view the derangement as entirely functional. Regarded in this light the notion of Dr. Maünlloch, that neuralgia is an intermittent fever of the part—a kind of local ague, in fact—appears extremely plausible; more especially when its frequent origin is malaria, its association with ague, and its periodicity are taken into consideration. But there are serious objections to regarding it as always of this nature, and we are hence driven to further hypothesis and conjecture.

My own views on the subject are peculiar. From an attentive observation of the phenomena, and by a train of reasoning which it is here impossible to follow, I have arrived at the conclusion that neuralgia is often a local disease, depending entirely on topical causes; that it is entirely functional in character, and that this function is so much exalted by the nervous

excitant as to give rise to *spasm* of the nervous fibril affected. The suddenness of recession and of remission; the perfect interruption of the paroxysms generally, and the peculiar sensations of the patient, all tend to this conclusion. This, of course does not preclude the idea of the disorder having a frequent origin in some general or centric derangement, such as is shown by its occasionally invading a variety of parts in succession and flying about from one region to another. This demonstrates the existence of a particular state of the system, or disease of the blood, perhaps, when the nerves take on this abnormal irritability. But on what this neuralgic *diathesis* absolutely depends, we have no means at present to determine.

(To be Continued.)

ARTICLE IV.

On Amalgam Stoppings. By W. R. BRIDGMAN, Norwich, England.

THAT many of my professional brethren should have entirely discarded the use of all metallic compounds with mercury, for stopping teeth, I can readily understand; but, with all due deference, the propriety of such a step I am very much inclined to dispute. Not, however, that I would have it supposed, for one moment, that I am about to advocate the employment of an amalgam in any single case where gold can be effectually applied; but there are very many cases in which the latter material is quite inapplicable, and where, without having recourse to some such composition, (for I believe there is no simple nattural substance capable of answering the purpose equally well,) numbers of teeth must be either sacrificed at once, or left in a state liable to become troublesome at any future moment, and probably with the additional inconvenience of interfering with efficient mastication, but which, by a filling of amalgam carefully and judiciously applied, might stand a fair chance of be-

coming healthy and serviceable for many succeeding years. And as it is the duty, and ought to be the study of every one to do the utmost in his power to save a tooth, rather than to extract it, we are scarcely to be justified, I imagine, in discarding the best of our present available means, until some more efficient and less objectionable substitute has been discovered.

That there are some objections to be made against the use of mercury or quicksilver in the mouth, I am quite ready to admit, but those that are most commonly urged against it, many years experience, and close attention to the subject have led me to believe are more the results of injudicious treatment and abuse of the material, than arising from its fair and legitimate employment. One of the most obvious of its defects is the becoming converted after a short time into a *black* and *porous* mass; which, of course, so far as a stopping is concerned, renders the substance infinitely worse than useless. This, more or less, I am sorry to add, is but too commonly the state in which they are to be met with daily, and were it an insuperable fault, would at once render all further experiments useless. Such, however, is not the case. Its porosity arises mainly from an imperfection in the mode of application, and affords tolerably strong presumptive evidence that the theory of an amalgan stopping is not *generally* understood.

A consideration of the essential requisites for a stopping of any description, leads to the obvious fact that the first and most important is, that it must occupy completely the whole space of the cavity to the perfect exclusion of air and moisture, and that for a continuance of fulfilling this, it must remain unaffected by the pressure and friction of mastication, as well as unaltered by the secretions of the mouth, or by any liquid likely to be taken either with our common food or medicinally.

That gold leaf, *properly applied*, possesses these in the highest degree is indisputable, but even this substance is too often ineffectual from defective application. Decay will frequently be found to have commenced at one or more points on the side of the plug, which sufficiently proves the inaccuracy

of its fit, or the insufficiency of the means adopted in the preparation of the cavity. But the former is the fault, I suspect, from the pressure being applied in the wrong direction. This, and the manner of folding and packing the gold, are scarcely of less importance than the careful preparation of the cavity itself. My own plan is to coil a strip of the leaf in such a manner as to obtain the greatest amount of soft and pliable substance in the smallest compass. To make use of a stopper not less than two-thirds the diameter of the aperture—to place the crumpled leaf across the cavity, letting it cover the sides as well as the bottom, and with a rim projecting above the edge, and to continue crossing it thus in every direction until considerable force is required to get the end of the tool inserted. This forms a "*tube*" and presses its outer surface into perfect contact with every irregularity on the sides of the cavity, and by gradually filling and well ramming its interior until it reaches nearly level with the surface of the tooth, and then gathering in the projecting rim, a plug will be formed, like a cartridge, entirely filling the interior of the cavity, and as inseparable by brushing, and ordinary wear, as if formed of a solid wire.

Now with regard to an amalgam filling, in what state are *its* component parts, and how is it generally applied?

Some kinds are in the form of small pellets, requiring to be softened by heat before they can be worked up into a paste fit for use. Others are kept in filings to be mixed with the mercury at the time of being used. The common manner of application is simply thus—the cavity having been previously prepared, and carefully dried, a lump of the paste is placed in the tooth, pressed down lightly, and wiped off with the finger. It then requires to remain some few hours undisturbed, before it becomes sufficiently hard for mastication.

If the remaining superfluous portion of the amalgam be rolled into a mass, and saved for examination when hard, its surface then will be found, under a lens of short focus, to present still the most unmistakeable evidence of its granular origin; having much the appearance of a fine grained sand stone.

But how should it be otherwise, for the mercury, unlike any common cement, has no property of itself, becoming fixed so as to fill up the interstices? The mass, when soft, may be said to be composed merely of amalgamated particles, held in mechanical suspension, and becoming hard only when it contains no more mercury than they are able to absorb.

In speaking of the alloys of mercury, Brande says: "many of these are definite and crystallizable compounds, and may be separated by gentle pressure, from the mercury in which the definite compound is suspended or dissolved." (Manual of Chemistry, page 798.) Most, if not all, these may be decomposed by being slightly heated: the mercury oozes out in the form of globules, and is then ready to perform the same part over again. Thus it is that many of the "stoppings" may be softened over and over again without injury to their setting propensity. It is to this crystallization that the porosity of the mass is owing. There is also in the act of becoming hard another change equally fatal to its effects as a useful stopping. This detrimental result, is *an increase in the bulk* of the mass, and that a very perceptible amount of expansion really does take place, may be readily proved in the following manner: Let a piece of ivory have a hole about a quarter of an inch in diameter, and rather more in depth drilled in its smooth and level surface; let this be then filled with the stopping and *immediately* scraped off level with a straight edge. When it has become hard, and, particularly, if the abominable "cadmium" has been made use of, it will be found to have risen considerably above its former level. To this defect may be attributed the falling out of a stopping so soon as it becomes hard. It is also the cause of the enamel breaking away from a tooth filled with it, as well as of the inflammation produced by the undue pressure to which a tooth often becomes subject in consequence. I think it may be fairly questioned, whether many of the supposed cases of mercurial ptyalism may not have been more the result of the latter cause, or perhaps that of a split tooth producing local irritation, than any real effects of mercurial absorption; although finely divided, and impure

state offers a most favorable facility for its being acted upon by the saliva, and converted into the protoxide or perhaps some more active of its salts ; I am still unwilling to believe in its occurrence without some more satisfactory proof than I have yet met with.

After having thus noticed its leading defects, it remains to be shown how far these may be reduced to a minimum or entirely obviated in actual practice.

In the year book of facts for 1849, page 67, J. W. Buckwell's invention for preparing artificial blocks of granite is described, as consisting of the following simple process : "Fragments of a suitable stone (Portland stone for example) are guaged and sorted into sizes. These are cleaned, and carefully mixed on a board with cement in the proportion of five parts of large fragments, two of smaller ones, one of cement, and a portion of water ; but the water is in no greater quantity than will bring it to the dampness of fresh deal saw dust. This being done, the materials are put into a strong mould to the depth of about an inch-and-a-half at a time; they are then driven together by percussion and hammered together till the water has escaped by holes pierced for that purpose in the moulds, and this process is continued till the block or pipe has attained the required magnitude. It is then taken out of the mould, and now found to be so hard as to ring when struck, and in ten days is fit for service. It will be noticed that this process is characterized by the use of fragments by the small quantity of cement employed (not one-fourth of the proportion used in common grouting) and by water, instead of fire, being made the means of bringing the fragments into close union. Mr. Faraday then noticed two scientific principles on which the success of Mr. Buckwell's process greatly depends.

1st. *The use of water in effecting the approximation of the particles, and the exclusion of the air.*

2nd. *The effect of percussion in bringing particles together.*

Mr. Faraday noticed, that simple pressure will not displace interstitial air, but that a blow will.

Here we have in the preceding process, a result obtained

perfectly analogous to the disideratum in a mercurial stopping, the greatest amount of density produced with the smallest quantity of cementing material; and, although it is neither possible, nor requisite, to use any considerable amount of "percussion" in stopping a tooth, yet, a kind of gentle jerk may be given almost imperceptibly, which will have the same effect. If a portion of stopping scarcely soft enough to adhere by pressure between the finger and thumb, be placed in a cavity, and treated thus, it will soon become "pulpy" on the surface, with a substratum of the filings, or solid part, jammed into a hard and unyielding mass beneath it. The mercury performing the same office, as the water in the former case. If this outer creasing substance be taken off, and either pressed dry, or rendered stiff with additional filings, and again applied until the cavity be filled, there will be found to have been but a very small quantity of the mercury retained in the stopping. Too little, perhaps, it may be thought, to render the mass sufficiently binding; but there need be no apprehension of this when *clean* filings of most of the ductile metals may be made to cohere by simple pressure alone. An instance of this, is the "sponge" gold, but the ephemeral fame of which, as a preferable form of the metal for stopping, is fast and most deservedly on the wane.

To get rid of the air bubbles, which are apt to be confined between the stopping and the tooth, particularly in the angles of the cavity, it is necessary to coat the latter first, with a very thin layer of the cement, worked about with a small tool and *sliding* instrument in every direction. After this, it may be filled up in the above manner with every chance of success.

If the piece of ivory containing the amalgam filling, used in the former experiment, be now placed within a clear glass jar or cup, with the stopping uppermost, and covered to the extent of about half an inch with cold boiled water, and then placed under the receiver of an air pump; on the air being withdrawn slowly, bubbles of air will be seen to emerge from the edge of the stopping, between it and the bone, and which, in the mouth,

would soon be replaced with saliva.* Let a plug of gold, prepared in the most careful manner, be now substituted for the preceding, and it will be seen how extremuly difficult it is to form an air tight stopping with this material *when used dry*, in comparison with the same *previously dipped in water*, and allowing this to take the place of air within its folds. The compressibility of the air, and its expansion on the removal of the pressure, renders the mass frothy, while the *non*-compressibility of the water, causes it to be squeezed out, and the plug to become far more dense than by any other means. I would strongly urge upon all, the desirability of well testing in this manner the merits of every preparation or material, and be so used before trusting it in the mouth. Had such precaution been taken with the "cadmium," and which I fortunately did on its first introduction, it would have prevented much discredit to the profession, generally, as well as loss of fame to many of its professors individually.

ARTICLE V.

Dental Inventions and Pretensions.

There is so much of unfounded assumption, and so much paltry jealousy abroad, that we cannot render more efficient service to the dental profession than to bring under its notice whatever may be calculated to compromise its character and lower its dignity, and we feel satisfied that the public odium, and public exposure, which inevitably follow these discreditable practices are the means of preventing these repetitions. The moment a valuable discovery is announced, there are a swarm of pretenders, or jump-up-behind persons, sure to start up and claim the merit and the honor and the profits of the in-

* To avoid the possibility of a portion of the air coming from within the substance of the matrix, as well as from the stopping, it would be necessary to use *glass cells*, (pieces of barometer tube closed at one end would do,) but for a rough experiment, the above answers every purpose.

vention, and the humble or modest man of genius, who may not be possessed of the necessary influence, or standing, to assert his rights, too often finds himself tricked out of them by unscrupulous swaggerers, and ignorant boasters ; the last case of this sort that has come before the dental and medical profession in Europe is, the mechanical invention for the relief of congenital cleft palate, the value and importance of which will probably account for the avidity with which it has been laid hold of by several conflicting claimants. A brief statement of the facts connected with this matter will enable the profession to pronounce at once upon the claims of the several candidates and draw their own inferences.

It appears that in December, 1844, Professor Fergusson, of King's College, London, read a paper before the Medical Chirurgical Society, respecting his views upon "congenital cleft palate" and the operation of staphyloraphy. Having explained the nature of his *modus operandi*, he referred to the various mechanical apparatuses that had been employed, and exhibited a whole series of casts, with different kinds of palates for correcting these deformities, which had been invented and constructed by the late Mr. Alexander Nasmyth, who it is well known in England, had devoted great attention to the subject of mechanical contrivances for this purpose. During the period of experiments and ultimate improvements, he had collected a large number of casts of the mouths on which he had operated, and experimented with the mechanical apparatus and notes attached to each case. Four or five years afterwards, in consequence of ill health, Mr. Nasmyth disposed of his practice to a Mr. Edwin Saunders, who, as a matter of course, purchased, also, the stock in trade, models, drawings, notes of cases, the various mechanical contrivances which Mr. Nasmyth had invented or improved upon and left behind him. Since that period the world and the profession have heard nothing of the inventive genius of the *successors to his practice and his position*, and it is only when a new claimant comes forward in the shape of a pamphlet, by Mr. Mapleton, "on the treatment of cleft palate by mechanical means," that the profession be-

comes suddenly apprised of who is "the real Simon Pure," whether arising from innate modesty, or because it would be more convenient hereafter to repudiate assertions that cannot be supported, this said Mr. Edwin Saunders leaves the task of eulogy and remonstrance to his brother, a Mr. Josiah Saunders, who intimates that brother Edwin is *about* to publish *his* views upon the same subject, that he has no wish to keep back anything from the profession, (seeing that they are already informed upon the subject from two or three different sources,) but is merely influenced by a desire not to commit an immature work to the press.

Now, it does seem marvellously strange, that Mr. J. Saunders and his brother should have forgotten a very important fact connected with this controversy. When Mr. Edwin Saunders, through his *agent* Mr. Josiah Saunders, lays claim to this invention, he appears to have altogether overlooked the rights of his predecessor, Mr. Nasmyth, whose business he purchased, and whose casts, improvements, &c., fell into his hands—he appears further to have forgotten that so long ago as four or five years since, a Mr. Stearn, surgeon, waited upon him and submitted his invention, which was similar to the one now published—that Mr. Edwin Saunders who had then just succeeded to Mr. Nasmyth's practice, on being applied to by a brother practitioner respecting the merits of Mr. Stearn's invention, was told in reply, that "it did not answer." No sooner, however, does a new claimant appear in the field and assert his right and the publication of a pamphlet, than Mr. Saunders comes forward and assures the profession that he is "the real Simon Pure," as he is appropriately termed in the *London Medical Times*. We believe, however, that neither Mr. Saunders nor Mr. Mapleton have the slightest claim to the honor of the invention, and we shall establish this position, we believe, most conclusively, by an examination of the peculiarities of each, and then leave the profession to judge of the candor and integrity of Mr. Edwin Saunders. Dr. Harris, in his work, page 781, describes Stearn's instrument as follows: "Consisting, first, of a gold plate fitted to the vault of the palate in the

usual manner, and to the upper and posterior margin of which, is attached a flat spiral spring, admitting of easy vibration, backwards and forwards, to the posterior extremity of which is attached a flexible velum of *caoutchouc*." Now, Mr. Mapleson's plan, as described in his pamphlet, page 12, is as follows: "A gold plate made to fit the roof as far back as the mouth would permit, to the pharyngeal part of this instrument was suspended a movable uvula composed of *gold*, and acted upon by means of a spring attached to the posterior surface of the gold plate." There is a very ingenius variation of phraseology in the description of the recent *invention*, which, with the slight difference in the use of the material employed, means precisely the invention of Mr. Stearn, and nothing more nor less, notwithstanding the great attention that Mr. Josiah Saunders assures us his brother has paid to this subject, it will strike every one as somewhat extraordinary, that he makes no reference whatever to Mr. Stearn's invention—that he makes no allusion to the improvements which Mr. Nasmyth, during his professional career introduced and perfected. His great genius appears to have had stomach for them all—he swallows everything into his capacious maw, and after digesting the views, the opinions, the mechanical contrivances and improvements of all who have preceded him, he comes forward, at the eleventh hour, disgorges the mass, and asks the profession to believe that it is his own. This, however, is presuming too much upon the credulity and common sense of the profession and the public. We all know that this said Mr. Edwin Saunders is not exactly the person to let his light remain hidden, either under a bushel, or his own mahogany, even it were only a farthing rush-light, and we must therefore infer that he had some very stringent reasons of his own for keeping this discovery secret. It is just possible that his delicacy of feeling may have arisen from the conviction that the time had not yet arrived when he could safely bring it forward as his own. Before the honors of the invention, thus barefacedly claimed by Mr. Saunders are awarded to him, it would be well if the profession were informed of the extent of the late Mr. Nasmyth's

improvements, and it would be desirable, also, to ascertain in what respect Mr. Saunder's invention differs from that brought forward several years since by Mr. Stearn, which is still in existence, and the merits of which have been tested and examined by several dental practiciens. R.

ARTICLE VI.

Dental Exhibition at the World's Fair.

The English metropolis has again resumed its usual business-like appearance, and its inhabitants have betaken themselves to their accustomed avocations; they are no longer jostled and hustled by the *starving*, fat-faced merry-looking thousands of agriculturists from the provinces, or questioned by foreigners with strange physiognomies, and still stranger costumes; in fact, Mr. John Bull has London to himself again, and merely looks upon the present state of the exhibition as the remains of its former greatness, and as no inapt type of what we are informed the New Zealand traveler will one day behold, when standing upon an arch of London bridge, he surveys the ruins of St. Paul's. It is not, however, to the New Zealand traveler, or the present state of the crystal palace, or the thousands of complaints of the different exhibitors in the different sections to which we wish to direct the notice of our readers. The various branches of the arts and sciences, have doubtless their own periodicals, by means of which, their wrongs can be brought before the public. Our duty is to direct the attention of our profession to the jurors appointed as judges in section X, in the great exhibition, a portion of which may be fairly said, represents our profession. The gentlemen appointed to preside over this portion of the exhibitors, were not, from the nature of their calling and education upon such matters, calculated to estimate rightly the various dental mechanism, dental appliances, porcelain work, &c., submitted to their inspection;

and even had they sought an explanation from the exhibitors themselves, (which they did not,) we have no hesitation in saying, they could not, by any possibility, possess the requisite competency to arrive at a just conclusion so as to form a correct judgment as to the scientific construction and applicability of the articles submitted. We presume, therefore, the jurors discovered their own incompetency in this department of the section, and therefore contented themselves with the mere inspection and the awarding of prizes for the best collection of physician's, surgeon's, aurist's and occulist's instruments and mechanical arrangements, which, to do the instrument makers justice, had taken especial pains to display to a *trading* and attractive advantage, by exhibiting their wares in immense show cases. Amongst the whole of this *collection*, for which prizes were awarded, we may safely assert, there was not one (excepting the dental instrument makers) which could be fairly termed modern instruments, used by dental practitioners. Yet these wise-acre professionals, who had so unceremoniously accepted this important office, as unceremoniously *dismisses* the whole batch of dental exhibitors, whose contributions, as we before observed, they could not, by education or practice, properly appreciate, as a poor law-relieving officer dispatches the applicants from his office without a thought or consideration. Surely the dental practitioners of Europe will well know how to appreciate the feelings of these *remarkable* jurors who hold their profession in such high consideration.

With these remarks, we will proceed to notice the various specimens of dental mechanism exhibited at the great exhibition in England in 1851. It would appear from the official catalogue, that there were no more than from eighteen to twenty practical dentists in England, Scotland and Ireland, who sent specimens of their mechanical skill to the exhibition, amongst which we noticed the following:

329.—Messrs. Sinclair & Hockley—A number of specimens of different kinds of artificial work, which were neither well finished or original in design.

441.—Mr. Waite—Specimens of gold blocks set with pre-

cious stones, on grinding surface; also, a bottle containing a strong acid, in which were deposited gold plates for the purpose of illustrating, that if a similar standard of metal be worn in the mouth, no chemical action takes place from the action of the saliva.

558.—Mr. Nolan—Exhibited an excellent specimen of mineral teeth, set in bone, highly finished, and artistically made; also, an assortment of old fashioned and roughly made swivels.

574.—Mr. Ghrimes—A number of specimens of natural and mineral teeth, mounted in bone sockets. The workmanship and finish of these specimens, deserved especial notice from the profession.

575.—Mr. Horne—A case containing several pieces of dental mechanism and regulating plates, &c. These we only notice for the inferior workmanship and bad finish.

576.—Mr. Laurie—A beautiful carved set of artificial teeth from the tusk of the hippopotamus. This was the most highly finished and artistically carved specimen, of this description, in the whole exhibition.

579.—Mr. Perkins—Several well executed pieces of bone work.

583.—Dr. Reid—Exhibited an ingenious compress for arresting dental hemorrhage, showing its applicability on a cast of the head, &c.

584.—Mr. Rausom—A set of Ash's gum teeth, badly fitted to gold plates.

601.—Mr. Miles—A number of pieces of artificial work, one of which, in bone, representing an upper set, was well executed and original in conception. This gentleman was the only practitioner who exhibited a full and particular list of the *prices* of his handicraft.

602.—Mr. Finsi—A set of teeth of inferior workmanship—a universal dental drill, consisting of a beveled wheel, fixed to a handle, acting on another attached to the shaft. It is a clumsy and unwieldy machine, which, if we remember correctly, is used by gun makers, &c.

636.—A *patented* instrument exhibited by Mr. Goddard for

extracting teeth perpendicularly; invented and ***patented*** by E. Browne, of New Bedford, Mass., America.

643.—Mr. Wood—A series of casts, illustrating the application of an old plan newly revived, for correcting and preventing irregularities of the permanent teeth, by means of a plate and screws; also, several rough and unfinished pieces of artificial work.

717.—Mr. Watt—A number of pieces of artificial work, excellently carved and finished, from the tusk of the hippopotamus.

718.—Mr. Dinsdale—A very inferior set of block porcelain teeth. Two casts of the mouth, illustrating the effect of artificial teeth in restoring the symmetry of the face.

719.—Mr. Rose—Teeth mounted upon gold; beautiful for its execution and finish.

720.—Mr. Trumen—Various kinds of teeth, mounted upon a basis of gutta percha, colored, and intended to represent the human gums.

721.—Mr. Harrington—An apparatus for moulding tortoise-shell for the beds of artificial teeth, a clever and ingenious apparatus for the purpose, but from the unmanageableness of the material, and its contracting properties, the whole process has been discarded by the profession as worse than useless.

Manufacturers of Porcelain Teeth.

578.—Messrs. Ash & Sons—A large assortment of artificial teeth and gum blocks, with gold tubes. The teeth, for form, color, and natural appearance, are unquestionably amongst the best in the exhibition. The block pieces are too flat at the edges intended to represent the gum, giving them an unnatural and formal appearance.

633.—Mr. Harnett—A large case, containing various instruments and materials used by dentists, with inferior specimens of block teeth.

Dental Instrument Makers.

640.—Mr. Weedon—Various well finished dental instruments of modern patterns.

647.—Mr. Everard—Enamel scrapers, showing their hardness of temper on glass; a number of highly finished forceps, with straight handles and beaks; also, the various stages of the instruments during the progress of manufacture.

678.—Mr. Jack—A number of well finished forceps, with straight handles and beaks.

France.

The dentists of this country were represented by only one exhibitor—a *Mons. Simon*—a rather ominous name for the respectability and progress of the profession, if we are to judge the present state of the mechanical art from the specimens exhibited, consisting of several roughly, inartistically made wire pieces, blocks of sea-horse, fashioned to represent teeth, a few caricatures of attempts at plate-making of the worst description.

Canada.

193.—Mr. Dickinson—A very excellent specimen of a pivoted American mineral, with section of tooth, showing the pin in root.

19.—Mr. Rahee—A well executed piece of dental mechanism, consisting of a set of gold plates, with tube teeth, set in sockets, retained in the mouth with spiral springs.

United States.

9.—Mr. Hunter—A piece for the lower jaw in gold, badly mounted, with porcelain teeth and worse finished.

47.—Mr. Wardle—Five plates and one full set.

61.—Mr. Reynolds—Two sets and two pieces admirably mounted and highly finished; not excelled in the exhibition.

63.—Mr. Buckingham—Illustrations of the various processes of making a set of teeth, with a very bad sample of zinc casting, several inclined planes for regulating teeth roughly made, in metal.

350.—Mr. Barlow—A well executed piece of mineral work with socket rim.

518.—Mr. Hitchcock—A well made set, in block, mounted on gold, with sockets.

558. ——— Philadelphia—Samples of teeth filled with gold, with sections showing the compactness of the filling. These are amongst the most beautiful specimens of pluggings we have ever witnessed, and the exhibitor, whoever he may be, need not have withheld his name.

Manufacturers of Porcelain Teeth.

33.—Messrs. Jones, White and McCurdy—A fine collection of porcelain teeth, with a great variety of shades, &c.; specimens of Hill's stopping, a most excellent substitute for the mercurial paste.

220.—Mr. Alcock—A large assortment of teeth of uniform quality, some of which, we were glad to observe, contained tubes similar to those made in England. If American manufactures were to turn their attention to this description of teeth, with their improved shades and *natural* shapes, for the English markets, we doubt not they would have an extensive demand, if sold at a more moderate rate.

419.—Mr. Stockton—Thousands of excellent teeth of every variety of shape and color. The molars in this collection appeared much too dark as a substitute for the natural organs.

Instrument Makers.

120.—Mr. Chevalier—a most beautiful collection of highly finished instruments, chiefly used by American dental practitioners, amongst which we noticed Dr. Hullihen's screw stump forceps. This exhibitor deserves the thanks of the profession for the excellent selection he made, and the superior taste displayed in their finish and manufacture. R.

ARTICLE VII.

Tartar on Teeth.

The salivary calculus or earthy concretion found upon the teeth, is called tartar; and, may be regarded as a type of the fluid from which it has been deposited. With the exception of caries, nothing is so destructive to the healthy condition of the mouth, and the duration of the teeth, as tartar; nor more offensive to the sight; while it cannot but prove equally injurious to health, as other bad smells. Tartar inflames and separates the gums from the teeth; and inflamed gums produce absorption of the bony sockets, in which the teeth are fixed; when, as a matter of course, they loosen and drop out. While the salts and other materials, of which tartar is composed, are yet in a soft, viscous, and adhesive state—their natural condition when first precipitated from the saliva, of which they form an important part, the deposition is called fur; and fur, as most people are aware of, is deposited on the tongue, and other parts of the mouth, as well as on the teeth. In this state, however, it is necessarily wiped away by the action of the tongue, lips, and food during mastication, from every part naturally subject to friction; and, obviously, admits of easy removal from the less accessible localities, by the judicious use of tooth-brushes, tooth-picks, and successful rinsing with water, or other approved washes. And we constantly find, that the prominent parts of teeth, like those parts of machinery in motion, which come in contact with others, are in a high state of polish, cleanliness and health; while the lines and seeming cracks, natural to their surfaces are foul, and disposed to decay; and while their interstices (which unfortunately go on increasing in size as the gums recede) are filled up with fur; which, in due time, hardens to tartar; and tartar itself, becomes constantly harder the longer it remains.

A first year's deposit, for example, is more easily removed than that of a second, on account of the great hardness of the

latter. There is a certain line, a sort of tidal beach running horizontally along both rows of teeth, above which, tartar is not permitted to collect, owing to the action of food during mastication; but, there is no limit to its deposition underneath, where the gums and teeth intersect each other; and, it accordingly eats away the entire substance of the sockets from sound teeth, substituting its horrid self to their very tips; and adhering with a tenacity which has caused it to be sometimes mistaken for bone, and more strangely still, it has been absurdly supposed to be a provision of nature, to support the teeth after the loss of their natural sockets. The materials of tartar at any stage retain liquids like chalk; and stagnant saliva, under the decomposing influence of the warm, moist atmosphere of the mouth, soon becomes rotten, and occasions offensive breath, alike unpleasant and unhealthy, and old-dark tartar, buried under spongy, scorbutic gums, and the habitually retained relics of decaying food, soften the bone; which softening is in reality the natural history of caries in teeth; and foul tartar is said not unfrequently to teem with microscopic life. Tartar consists principally of carbonate of lime, animal, and other matters, the relative proportions of which, however, differ so much in different persons, and in the same persons, at different times, that any two analyses rarely furnish the same results, as may be seen from the three following accurate analyses furnished to the Lancet, by Dr. Wright:

	1st.	2nd.	3rd.
Carbonate of lime,	81.3	79.4	80.7
Phosphate of lime,	4.1	5.0	4.2
Muriates, hydro-sulphocyanates, lactitis and carbonates, (potash and soda.)	6.2	4.8	5.1
Animal matter, consisting of ptyaline, albumen and mucus,	7.1	9.5	8.3
Loss in experiments,	1.3	1.3	1.7
	100.0	100.0	100.0

There are, comparatively, few persons in civilized life, whose teeth remain permanently free from tartar; and many, from constitutional causes, that appear to be harmless in other respects, are much more subject to it than others. Even in animals, when confined in menageries or pampered as pets, and having no longer the same occasion or opportunity of exercising them as formerly; the teeth become rusty, and loaded with tartar; and with the same results, as in the analogous case of human beings. In accounting for the existence of tartar, it may be observed, that the animal fluids, when out of the course of general circulation, are apt to stagnate, and deposit sedimentary matter.

That, although during health, the flow of saliva is sufficiently copious to carry off in the food its more solid contents, as swollen streams scour their beds, yet, on the other hand, when vitiated by disease, its supply becomes scanty, sluggish and viscous; and forms an inspissated mucus, not on the teeth alone as already observed, but on the tongue and other parts of the mouth. With a barnacle-like grip, it fixes on the more rigid surfaces of the teeth, and remains on those parts only that happen to lie beyond the reach of friction during mastication, till it becomes tartar. Fur settles down in their layers, like tidal deposits upon the teeth and gums, and in their interstices, filling up and leveling with its pernicious substance, the breaches itself had made; and in such a manner as often to produce the deceitful appearance of a beautiful and perfect mouth, which it would seem a pity to break up; although, like a snake in the grass, it is all the while actively employed in destroying every thing within its reach.

In the absence of tartar, and with sufficient employment in masticating plain food, or wanting that, with successful brushing—the gums ought to be, like other healthy skin, thin, free from bleeding, and in apparent adhesion to the teeth; while below healthy gums, the sockets of teeth ought never to become absorbed, nor in any way diminished; nor do teeth loosen and drop out until the sockets have first been destroyed. There are two methods by which tartar may be kept off the teeth;

the one natural—as when the teeth are well employed, as by barbarians, an abundance of plain food, the relics of which do not remain about them at any time; the other, artificial—as when teeth are successfully brushed, picked, and rinsed, throughout their interstices every day. The teeth of dogs and cats, running at large, are, in general, beautifully clean; and may be taken as examples of natural cleaning; while those of pets of either kind, are subject to the same diseases as those which attack human beings. J. P. C.

ARTICLE VIII.

On Materials the best adapted for Filling the Teeth. By WM. ROBERTSON, ESQ.

THE existing cause of what has been termed decay of the teeth, has long since ceased to be a disputed question.

In July, 1835, when the first edition of my work was published, and which has now arrived at a fifth edition, the subject of controversy was, whether the *cause* of the destruction of the teeth be attributable to inflammatory action, or to chemical agency. This is no longer a disputed question. It is now admitted by every practical and intelligent member of our profession, that the destruction of the teeth is occasioned by chemical agency, and *not* by inflammatory action. It is now clearly perceived that the attack upon the teeth is always made from without, and never from within, and it is equally clear, that the mischief never begins upon the smooth and level parts of the tooth, but is always found to commence in pits, fissures and interstices upon their surfaces—receptacles where the more liquid portions of the food are admitted and retained until decomposition takes place. The deposit having undergone this change, acquires a property and power, similar to an acid, of acting upon the phosphate of lime and animal matter, the two substances of which the teeth are composed. The result of this action is the destruction of the power of cohesion which pre-

viously existed between these particles, consequently the structure becomes changed from a state of crystallization into its component parts.

That this is the real cause of the destruction of the teeth, is clearly evinced from the very nature of the operations which have so long been proved effectual in remedying the evil. For instance, in using the file, our object is to remove the cavity or resting place where the food was retained, and by making a plain and smooth surface, no future lodgment can take place, and the mischief is arrested.

In filling the teeth, the object and principle is the same as in filing them: for the destructive matter is removed from its resting place, and permanently excluded by filling up the cavity firmly and securely with a durable substance that is not liable to corrode or injure the structure of the tooth, and the evil is remedied. The consideration then is, what substances are the best adapted for this purpose?

Pure and well prepared gold leaf is undoubtedly the best and the most durable material which has yet been discovered for filling the teeth, and particularly so when the operation is performed in the early stages of decay, and before the slightest tenderness has been felt in the tooth. I should, therefore, recommend gold to be used in all cases where it is practicable, in preference to any other filling. But we have numerous cases which present themselves where gold cannot be used, and where an amalgam becomes a necessary substitute.

It too often happens that filling is neglected until decay has made considerable progress. The cavity having become larger, the surrounding walls thin, and the tooth so tender, as not to admit of the pressure necessary to condense the gold into a secure and solid plug without the risk of producing pain or splitting the tooth. There are also various cases arising from the position of the decayed parts, and the shallowness, or saucer shaped form of the cavity, where a gold filling would not remain, and where it becomes necessary to use an amalgam.

The consideration then is, what materials are the best to form this amalgam?

I have given much time and labor to the investigation of this subject, and after numerous experiments with the various metals, have come to the conclusion, that gold, silver, platina and tin, in their pure state, are the best; because, I have found, in using them, either separately or combined, that they resist the acids of the mouth better than any of the other metals. An amalgam of these, however, cannot be formed without mercury; but the smaller the portion of it the better, so that there is just sufficient to unite and hold in permanent combination, the purer metals above specified.

The amalgams in general use, even those of the better class, which are composed of the metals above mentioned, contain a great deal too much mercury; and I shall presently show that the cause for this superabundance of mercury, arises from the incorrect proportioning of the metals and the improper mode of mixing them.

The method generally adopted in preparing an amalgam, is to combine the mercury at once with the other metals, so that the compound may be in a state of readiness for using; and when a portion is required, it has to undergo a process of heating and rubbing to bring it back from its crystallized form to a pasty state before putting it into the tooth.

Instead of adopting this method, the mercury ought to be kept separate from the other metals, and only mixed with them at the time of using. This mode of mixing with the metals, rightly proportioned, will produce a harder and more durable filling, and the metals will combine with one-third of the mercury required in the former mode of preparing the amalgam.

As an illustration of this fact, even in the better class of amalgams, I may refer to a paper that appeared in the Pharmaceutical Journal for March, 1850, on amalgams for stopping the teeth, by Arnold Rogers, Esq.

"I have much pleasure," he says, "in communicating through the Pharmaceutical Society, a few remarks on amalgams, as well as the formula for the one I have used for some years, and although occasionally some specimens have come under my observation which seemed to possess qualities superior to the gen-

eral characrer of amalgams; yet, on the whole, I have been satisfied with my own compound, not but that I think it may be improved upon; and, when leisure time will allow me, I shall endeavor to profit by the hints of my professional brethren."

After a few remarks on various amalgams, Mr. Rogers proceeds to point out the method of preparing his own. And first, an amalgam is composed of silver one part, and mercury four parts. This amalgam of silver is to be united with an amalgam of gold, which consists of gold one part, mercury three parts. These are to be kept in separate boxes, and when used, the proportions are to be two parts by weight of the gold amalgam to one of the silver; thus making the amalgams, when combined, to consist of silver one part, gold two parts, and *mercury ten parts*. Then, as to the manner of using it. "The two pellets had better be triturated thoroughly in a mortar before the compound is submitted to the flame of a spirit lamp; and I have observed," he says, "that for the better incorporation, it is necessary to submit it to the heating and trituration, in the usual way, three or four times. The cavity of the tooth being quite prepared for the reception of the amalgam, all the mercury that can be pressed out between the thumb and fingers should be so separated, and the compound immediately packed in the cavity."

Now I feel persuaded, that Mr. Rogers will agree with me as to the desirability of getting rid of a portion of this mercury; and I shall presently show that by using the same metals, with the addition of another, and by proportioning them and preparing the amalgam differently, we shall be enabled to dispense with *seven parts of this mercury out of the ten.*

Some dentists use an amalgam of palladium and mercury, which makes a firm and durable filling; but it becomes black in the tooth.

A few years ago, cadmium was introduced as a filling, and for a short time it promised well, and appeared to be an improvement upon former amalgams; but after a few months trial, it showed its defects and was very properly discarded. It neither retained its color, nor its hardness, for when acted

upon by the friction of the opposing teeth, it soon wore away, and when not acted upon, it became, in parts, yellow as saffron; with the disadvantage, also, of having a strong tendency to produce galvanic action in the mouth. Objectionable as this compound is, it still continues to be used, by a certain class of practitioners, under the title of "Parisian Filling."

There are various kinds of amalgams used by the same class of individuals, which contain copper, lead, bismuth, zinc, and antimony, all of which are bad.

To test an amalgam properly, is a work of time; a few months is not sufficient, years of observation are required to ascertain its real character and to judge of its utility. Its introduction to the public, ought, therefore, to be the act of an experienced member of the profession; for it becomes rather a serious matter, if we find that the filling we may have been using pretty freely for six or twelve months, upon the strength of another's recommendation, should turn out, after the manner of the cadmium preparation, a complete failure.

The amalgam which I am about to describe, contains nothing novel, so far as the materials are concerned. There are no new metals introduced; they have all been used in different forms for many years; but it is in the proportioning of them, and by a different method of preparing the compound, that I have been enabled of late years to get rid of two parts out of three of the mercury formerly required; and this I consider to be an important advantage; for as I have before said, an amalgam cannot be formed without mercury, but the smaller the portion required of it the better.

Since making this change, I have had ample time, upwards of three years, to test the merits of the compound, and can, therefore, speak practically of its utility.

The amalgam consists of gold, one part; silver, three parts; and tin, two parts; and it is of the utmost importance that the metals should be pure—free from the smallest particle of alloy.

The mode of uniting the metals is, first to put the gold and silver into the crucible, and just as they are at the point of melting, add the tin, which requires less heat than the former.

When they become melted, but not over heated, pour them from the crucible; melt them a second time for the purpose of having them properly mixed, and then pour them into an ingot, of a shape the best adapted for reducing the compound into the finest powder.

The mercury is to be kept apart from the powder, and mixed with it at the moment the amalgam is to be put into the tooth.

The mercury must be perfectly pure and the quantity required will be equal in weight to the powder; and here we get rid of *seven parts of the mercury out of the ten before mentioned*.

In mixing the powder with the mercury, the exact proportions of each can be ascertained to the greatest nicety, and by a very simple process, which will save time and material, and which, I believe, makes a firmer compound, than by using a larger portion of mercury and squeezing part of it out again.

A measure for the mercury may be made from a square portion of ivory, by drilling in it three holes, one may be made to contain four grains, the second eight, and the third, twelve grains. The mercury to be poured into either of these as more or less may be required to fill the cavity of the tooth, and by drawing the finger across so as to bring the mercury on a level with the surface of the ivory, the portion wanted is accurately obtained.

The measure for the powder is equally simple and convenient. It is a metal tube, with a handle attached, calculated to hold four grains, which is also got to a nicety by filling and then drawing the finger across the mouth of the tube, so as to make level measure.

The mercury should be kept in a small bottle with an India rubber tube attached to the neck of it, and the mercury is readily pressed through the tube into the measure. In this way the exact quantity of each of the metals is readily obtained

The powder and mercury to be emptied from the measure into a small glass mortar, and rubbed till they become mixed. The compound is then to be rubbed firmly with the finger in

the hollow of the hand, till converted into a paste, which, before hardening, allows plenty of time for inserting it into the tooth.

I have found this compound to be far superior to the former class of amalgams. It does not, like palladium, and some of the other metals that have been used, become black in the mouth. It retains its hardness and firmness of texture, and is not like the cadmium, liable to be worn away by the friction of the teeth.

Formerly, in fixing artificial teeth upon a gold plate, it was necessary to avoid bringing the gold in contact with a tooth filled with an amalgam; because a portion of the mercury entered into the gold and destroyed it, this evil is now remedied by the compound containing so small a quantity of mercury, which is held in permanent combination with the other metals, so that not a particle of *it* is abstracted by the embrace of a gold clasp. With these important advantages over former amalgams, it is also used with much greater facility.

From experiments which I have made during the last twelve months, I find that the quantity of mercury which I have named, can be reduced still further, and which, I believe, will be an improvement upon the present compound; but as I have before stated, more time and practical experience, to test the result of even this alteration, is desirable before taking the responsibility of giving it to the public.

THE SQUARE, BIRMINGHAM,
May 1st, 1852.

ARTICLE IX.

On a New Soldering Apparatus. By SPENCE BATE.

A short time since being on a visit at my father's residence, who practices at Plymouth, I was struck with the utility and effective adaptation of an apparatus for soldering, which is calculated to supersede the blow-pipe and lamp, as being less expensive in work, more powerful and easy of performing its duty, while it relieves the workman from the wearying, and, perchance, hurtful task of using his lungs as a pair of bellows. It is upon these accounts I believe it to be worthy of being communicated to the profession, as a valuable adjunct to the mechanical department, and therefore avail myself of the pages of the Journal of Dental Science, for that purpose.

The apparatus consists of a large sac or resevoir (A) made of vulcanized India rubber, covered externally with a net, the top and bottom (B and C) side figure, being a flat piece of wood, cut round upon the outer side, but square where it is brought in contact with the wall against which it is fixed. The lower of these is stationary, while the upper is movable, thereby constituting a bellows, which, instead of being filled with air, is charged with coal-gas.

Through the bottom or floor of the reservoir are made two holes, to which are connected pipes—the one being in continuation with those which supply the rest of the house, is an inlet; the other being connected with a flexible tube and blow-

pipe, is an outlet passage. The inlet pipe has a stop-cock (P) which is used in order to secure the gas against returning, and passes through an ivory channel, where the reservoir is full, in order to facilitate the injection of which, an iron rod, connected with a rope pulley, is attached to a circular board which forms the top or roof of the reservoir; at the opposite extremity is appended to the rope, a weight (E) which assists in overcoming the atmospheric pressure upon the reservoir, which otherwise is too great for the pressure of the gas to overcome unaided.

The reservoir being charged, and the inlet stop-cock turned, it is necessary to place a weight, which, in this case, amounts to about 28 lbs. on the top, and the apparatus is ready for use.

From the reservoir, the outlet pipe runs parallel to the other for a short distance, where it receives a head, and is also furnished with a movable joint to enable it to be of greater practical value; attached to which is another stop-cock, (P,) beyond this point the pipe is continued in the form of a flexible tube, made of India rubber, to the extremity of which is attached a simple blow-pipe, through which a jet of gas escapes, which, upon being lighted, makes a valuable soldering power; the quantity and force of the flame being perfectly under control, without the assistance of any lamp or blowing; a circumstance which must be appreciated by those who suffer from such kind of exertion.

There is a wooden ring within the reservoir to keep it in position, and the net outside also prevents any distortion such as might result from the inequality of the strength or thickness of the India rubber.

When the apparatus is required for use, the weight (E) should be belayed to the point (K,) or better still removed, when not in use it should be left suspended, or the pressure of the weights at (F) would drive the gas back, though the stop-cock (I) may be turned.

When the reservoir is empty and require to be filled, it is necessary to remove the weight on the top (F) or, perhaps, which may do equally as well, an equal number of pounds may

be added, additional, to the suspended weight at (E;) otherwise the gas has not sufficient power to inject the sac.

The cost of the whole apparatus is about £3. £2.10 for materials, and 10*s*. for labor in fixing it up.

The economy appears to be much over that of common oil to use.

The reservoir contains two square feet of gas, which, at the price of four shillings per thousand feet, may be filled 125 times for two shillings, each time, being capable of doing all the blow-pipe and soldering work for a simple set, and is capable of melting brass wire the one-eighth of an inch in diameter.

Since my attention has been drawn to the apparatus here described, I have heard of a blow-pipe used in a chemical work, some miles from this town, wherein hydrogen is the gas employed, and so perfect a deoxydiser is hydrogen, that two neutrals, gold and silver, for instance, will unite without the assistance of flux or solder, and so powerful is the heat, that it will solder substances, far out of the reach of ordinary blow-pipes, and since hydrogen is capable of being obtained at a price nominally insignificant, I am inclined to think it will be an agent most capable of superseding others now in use. I am about to have one fitted up in my work-room, the result of which, after a fair trial, I shall feel happy to communicate to the pages of the Journal of Dental Science.

A, The Reservoir.

B, Top made of circular piece of wood.

C, Bottom made of wood fixed to the wall.

D, Inlet pipe connected with public reservoir.

G, Stop-cock to preclude the return of gas.

H, Outlet pipe.

I, Flexible tube, made of vulcanised India rubber.

L, Blow-pipe.

F, Weight, to force the gas through the outlet pipe when required.

E, Weight suspended to counteract, when required, the pressure at F.

ARTICLE X.

Gratuitous Services Injurious when given without due discrimination.

In times like those we live in, where there exists a fearful competition, and when it is most true, "that the battle is not always to the strong," we affirm that evil, so far as the medical profession is concerned, is greatly aggravated by giving, indiscriminately, gratuitous services to all who apply for the same. A few of the evils may be enumerated. Whatever is given away, or, which may be had on mere application, is, in a general way, very little valued. Elemosynary assistance, like gratuitous medical or surgical advice, may have a demoralising tendency.

1st. Because the persons who are the recipients of charity, or of unpaid services, lose their own self-respect, and suffer corresponding degradation. That such is the case, compare persons so situated with those who use their own efforts to avoid being dependent on others. Further, that the degradation becomes greater by every fresh compromise. So that a moral scale might be drawn, indicating the frequency of these acts.

Men's minds when once they take a downward motion, are governed by the laws of *momentum* like natural bodies, and acquire an accelerated motion as they approach the earth.

Those, therefore, who trust to others on all occasions, ultimately acquire a crawling attitude, and then there will not be any disinclination to receive any thing that is offered ; or, any diffidence in asking for gratuitous services. We do not wish to be misunderstood—we are not speaking of the utterly destitute ; or, of those cases when some sudden and frightful accident occurs, requiring great care and constant attention, more than the means of the sufferer would enable him to procure : and hence, for such it is an advantage, that there are public

hospitals and dispensaries. But it is our object to show, that those who now cheat the medical man of his fees—spend the money in sensual indulgences; and that if they were industrious and frugal, they will have ample means to pay for such important services. In their history, we find them preferring the beggar's life, by spending all they get on themselves, without bestowing any thought on the wants of the morrow.

My remarks apply, in particular, to a vast number who obtain the gratuitous service of men in private practice, such as general practitioners, aurists, occulists and dentists. It is not the very poor who alone avail themselves of getting cured without any gratuity. Tradesmen and others, who could, and ought to pay, seem to think that professional men are so ethereal, that they and their families can live without food!

Mere thanks are not a legal tender which can be exchanged with the baker, the butcher, the grocer, &c. And yet, we have known the families of such worthies, take the advantage of the *gratis* hours of professional men. And what is still more annoying, actually suppose, that they are conferring some supposed benefit, and in their vulgar tongue, say: "*Otherwise, Mr. ——— would not do it for nothing.*"

In my own practice, I could cite some shameful instances, the following sample will suffice:

One morning, a well dressed woman, having on a fine silk gown, fur cuffs and boa, a handsomely trimmed bonnet with a black veil, and a gold watch at her side, came to have some stumps extracted. On being shown into my surgery, she said: "This is your *gratis* morning!" Yes, mam, for the very poor.

I wish you to take out my stumps, as your hour is not up yet?

This coolness and impudence staggered me.

She sat down, and I soon removed the objects of her annoyance. But afterwards, I told her, she had done an injury to the very poor, as from that hour, in order to protect myself, I would not, in future, attend any one without a letter of recommendation.

Having taken one view of the subject, let us now turn to

another, that there is one great advantage in attending the very poor in large towns, viz. That, in their cases, diseases are often seen in their extreme forms. For, it is worthy of remark, that the very poor have often their minds so saturated with care, or their habits are so reckless or dissolute, that they heed not the first symptoms of any affection. And it often happens, that both these classes of persons will bear the most frightful and painful maladies, until they are almost beyond endurance; and then they seek advice from those who devote some portion of their time to gratis services. And often, although such practitioners do not obtain the slightest pecuniary recompense, they have the advantage of becoming acquainted with the *phases* of long standing and malignant diseases.

In my own dental practice, I have for many years devoted some mornings to assist any suffering mortals, whether they paid or not; and I have had often to marvel at the evils of ignorance, and to perceive the real benefit of mental cultivation.

Much actual professional knowledge I have thus obtained, and many of the cases submitted to my treatment, often excited my deepest sympathy.

But I also learned the secret source, and influence of quacks, and their means of profit. When the poor put themselves to the inconvenience of paying, they the advertising, "Cheap Operator;" or, if a medical case, the victims of the charlatan is lured by promises of speedy cure, and low fees. Hence, those who desire to be so far independent, and still unwilling or unable to pay a guinea or half guinea fees, go to the cheap doctor. And, in both instances, the poor patient finds that he has, after all, the worse bargain.

I will relate an instance or two in my experience. My late esteemed friend, Richard Casson, Esq., an eminent surgeon, at Hull in Yorkshire, brought to me, on one occasion, a man with a very large swelling on his cheek. The patient declaring, that he had had it ever since Dr. ———, (a gunsmith and dentist,) had drawn his tooth! The abscess looked very inflamed and shining, and on pressing its sides, I felt some foreign body, which evidentally moved about. We then cross-examined

the poor fellow, and he said, Dr. —— was drunk, and that he had torn with a claw, (as he used a huge sized key,) the inside of his cheek. It was the second molar on the right side of the upper jaw.

The patient said he had bled profusely, after the extraction of the tooth; so, in his fright, he had forgotten to ask for it. That he afterwards, applied for it, when the gunsmith-dentist swore that he had swallowed it.

There was a large cicatrix in the inner side of the cheek, through it I made an incision of rather more than an inch in length, which enabled me to remove a large carious tooth with three fangs. The man soon got better, and his health was ultimately restored.

I have another instance of the "cheap jack" operators. The poor fellow, having put himself under the treatment of a village blacksmith, who combined with his real craft, that of cow leech, horse doctor and dentist! It is in the latter department we have to speak of him.

He is represented as repudiating the art and mystery of dental or other science, "as stuff and nonsense," and brandishing a collossal key instrument in his giant hand, declared, that he could take any teeth away "with this ere instrument;" but he did not add, *"charges as in Paris," for he only took six pence* for large teeth, and "little ones," he took out for three pence. I have in my own dental museum, a specimen of his handy work, and a demonstrable evidence of his prowess. It is a first molar and two bicuspids* of the upper jaw, with their *alveoli* and gums, which he (the blacksmith) had broken down, in his endeavor to remove the carious molar; but, which happening to be anchylosed, resisted all ordinary efforts of such an operator. However, the blacksmith had too much self-esteem to be beaten, so he applied, what may be literally called, "brute force," and the whole three had given way, unable to resist "the long and the strong pull" of his mighty

* In the English fairs, there are travellers, who sell, by what is called a Dutch auglurd, descending lower and lower, they are called "cheap jacket."

arm. This uncouth vulcan dentist, seemed more fitting to operate on some cyclops, rather than on a biped patient.

The specimen of clumsy surgery, was given by one of my brothers, as it had been presented to him by the surgeon, who attended the poor victim. For two years, portions of bone exfoliated, and extensive irritation was kept upon the system. And it cost the suffering man many pounds, and brought him the experience, when almost too late, that, at least, if in no other case, in dental and other surgical operations, "the cheapest is the dearest." J. L. Levison.

ARTICLE XI.

Patents in any of the Different Branches of Medicine. By W. R. Handy, M. D.

The subject of the *propriety* of patenting any *improvement*, *discovery* or *invention*, which bears upon the art of medicine in any of its several branches, is now engaging the attention of the medical and dental professions, and calling forth the opinions of some of their members on this point.

It is a subject of great interest—involving, as it does, that highest of all temporal interests, viz. the preservation of human life—as well as bearing directly upon the noble art of medicine, touching its honor, dignity, and world-wide benevolence.

It is a subject admitted to be of some difficulty, and about which, honest and intelligent minds have differed, and which, therefore, makes it the more necessary, that some general agreement of sentiment, as well as harmony of action, should universally prevail.

To this end, we purpose making simply a few brief remarks on the point at issue.

The law recognizes the right of an individual to any invention, improvement or discovery in the construction of machinery of any kind, and protects such right by granting a patent, so as to remunerate him for the labor, time and money he may

have expended in perfecting such machinery designed to add to the bodily comfort of man.

Copy-rights are also secured to authors for their loss of time, labor and money, in adding to the intellectual improvement of man; and the general voice of the people seems to be, that such laws are right and just, as no individual can be expected to make such sacrifices without remuneration.

But, when you come to the subject of disease—the saving of human life from suffering and death—the question then of protective right to improvements, discoveries and inventions, does not, by any means, meet with the same unqualified approval.

Why, we ask, this difference? And what the origin of such feeling?

It may be said, that if the steam engine wafts us with rapidity from point to point, either for pleasure or business, and the electric telegraph conveys, with lightning's speed, a world of thought, sayings and doings, in, almost, an instant of time, to the remotest places; and the cotton gin and loom, with all their curious and complicated appliances, furnish suitable material for the clothing of the body; and the stereotyped volumes of men of genius for informing the mind. If all such productions as these, it is asked, merit, and justly claim, the protection of the law, how comes it that improvements, discoveries and inventions, relating to the far higher interests of preserving life, should be considered unworthy of a like protection?

It is true that patents in medicine have been obtained, but these are comparatively few in number, and even these few, we are of the opinion, are very far from receiving the approval of the great body of the profession, or even of the people at large.

Why, it is again asked, is it, that discoveries and inventions relating to disease, should not be patented? It has been already stated, there was no legal difficulty in the way; but, only the general feeling, both professional and unprofessional, which was against it, and it is just this feeling which seems to form the reason, why the opinion is so prevalent that patents, in all such cases, are wrong.

Now, if such feeling as this were only occasional, and occurred but in few cases, it might be thought of little value, and scarcely worthy of notice; but when, on the contrary, such feeling becomes universal; when it is found in the savage as well as the civilized man; in the ignorant as well as the informed, the inference seems fairly to force itself, that such feeling is fundamental to our nature, of binding authority, and enforcing a moral obligation, which every one feels as instinctive to his very being.

Now, if this be true, the common opinion of mankind is against all patenting whatever in medicine, and regards all such privileges as so many violations of the moral rights of the people, as manifested through the moral sense, in determining what is right and what is wrong.

Such a view as this, it would seem, places the medical profession upon a great moral basis, and makes the every day business of that profession, viz. healing the sick, of such a high and sacred character, and of involving such weighty responsibilities, as not, for a moment, to be put in contrast with, or placed by the side of simply dollars and cents, when the life of a human being is at stake; and he, therefore, who would obtain an exclusive privilege, by patent, to save men's lives, and that only such as would choose to pay for, and obtain the healing virtues of such patent, must be doomed to die, would at once be pronounced a very monster of avarice and cruelty, a being in human shape, but thoroughly destitute of all the feelings of a common humanity, as well as of common decency.

In a word, the *art of healing* has more than once been styled a divine art—one not to be acted out, and measured by pecuniary profit—but one to be as free as the air we breathe, and one consequently allowing no restrictions or exclusive privileges, when designed by the God of nature as the common heritage of all mankind.

Hence, the medical profession, with the noble magnanimity of a liberal science, have always discountenanced every thing like nostrums, and all secret remedies for the cure of disease, and further, to refuse fellowship with the man who will thus,

either knavishly or ignorantly, trifle with the life of his fellow man.

The medical profession is regarded as a common profession —as one great brotherhood for the common good—consequently, having one common interest, and thus, by the common contract, necessarily having a common share to the accumulative property belonging to the common stock.

By such an agreement, no one member, therefore, can claim any exclusive right or privilege over that of any other member, and he who would set up such claim, by taking out a patent, thus virtually nullifies his allegiance to the compact, severs his connection with the profession, and is no longer regarded as an honorable member; and why? Simply for laying claim to that which does not belong to him. It is the property of a common profession, consequently belongs to all, and no one, hence, can have an exclusive right.

What each one can add to the common stock, it is considered, not only that he receives, out of that common stock in return, a full equivalent, but further, a measure fully heaped up, and running over; and that mind, it is believed, must be possessed of no small share of vanity, to think that all other minds have contributed nothing to the common stock, and that from this universal poverty of mental contribution, this alone luminary, receiving nothing in return, modestly comes out and claims a patent for extra contributions of services rendered.

With this explanation of the principle, involving the right of patenting in general medicine, we come now to consider whether this same principle is applicable, or not, to all of its specialties.

If the principle be applicable to the whole, it most assuredly must be so to the several parts, as, out of these same parts the whole is made; and, though it may not apply with the same force to each, yet all must feel its influence in a greater or less degree. And it is because the working of this principle seems so faint when applied to what are called the mechanical branches of medicine, that some very honest minds have been led to the conclusion, that the principle does not apply at all, and that

patents, therefore, are justifiable upon the same grounds, as all other improvements of the day. As, for instance, in surgery and dentistry, where various kinds of contrivances, such as *splints*, *trusses*, instruments, &c., claim the right of being patented, without it is thought violating that general law relating to the improvements necessary to the successful treating of disease. In other words, the patient will get well without my improvement; therefore, I have a right to a patent; but, as he can get well much sooner with my improvement or discovery, therefore I have full right to make all patients suffer who will not buy my secret, as well as cheat my professional brethren by not rendering to them as they have rendered to me.

Now, in the mechanical application of splints to a broken leg, the great principle for a successful cure is, that the leg shall be kept at rest—the splints do this—and consequently aid in the successful cure of the limb; and, therefore, we think, has no more right to a patent, than the medicine employed for subduing inflammation, fever, &c., which is also equally necessary for a successful cure.

But, if it be said the limb would get well without the splints, all good surgery denies the fact, and only admits such cases, when they occur, to be rare exceptions to the general rule, of their indispensable necessity.

And even admitting the bone would unite without the splints, yet, who would be willing, under the shelter of a patent, to inflict all the suffering which, as a sound pathologist, he knows must necessarily follow without their use. In other words, the splints must be regarded as an essential part of the remedial agencies, necessary for the most successful, safe, and speedy cure of the disease.

And so in all surgical appliances, we hold, the principle is equally binding; as they all have a direct bearing upon, and especially designed to aid in the cure of disease; and though their aid may be considerd humble in the part they take, when the propriety of a patent is questioned; but of vast importance when it is to be obtained—yet, as it is allowed to be an aid, it matters little whether that aid be small or great—it forms

an indispensable link in the great chain of cure, and should not therefore be withheld by a patent.

In dentistry, the patenting of inventions is no uncommon occurrence, and there does seem, at first view, to be some greater plausibility of the propriety of an exclusive right in this profession, than in that of general surgery; but if the general principle contended for be correct, the dentist has no better claim to a patent than the physician or surgeon.

It is true, at one period of the world, dentistry was not regarded as a science; nor acknowledged as a legitimate specialty of medicine; the teeth were not regarded as organs; but rather viewed as so many foreign bodies placed in the mouth, after the manner that nails are driven into a board.

Gomphosis was the term used to express the kind of articulation that was supposed to exist between the teeth and mouth; that is, that like the nails of the board, there was little or no vital union, such as we find exists between organ and organ; and that, consequently, all operations upon such bodies, could, in no way, sympathetically affect either adjacent organs or the system at large. With such views, it is not to be wondered, that mechanical dentistry reigned supreme, and that mechanical dentists should apply for patents. But, now that it is well known, that dentistry is an essential part of medicine, and that the teeth are organised bodies, possessing all the elements of organization, as, viz. in having blood from a common circulation, and nerves from a common sensation, and thus establishing a common sympathy with the general family of organs, thereby make the teeth as the rest of the organs to be endowed with life; and as such, subject to disease, and thus render all the appliances necessary to the cure of their diseases, as not coming under the head of justifiable patents, more than those of general medicine, which have just been considered.

But it is further suggested, that if the individual has retired from the profession, and no longer reaps any of its emoluments, that then he may fairly claim the right of a patent, and the exclusive enjoyment of all the benefits flowing from such right. We reply, that such retirement should not justify the

nullification of a solemn compact, and the trampling under foot a moral obligation, to the great damage of suffering humanity—an immense loss to a vast many, and but trifling gain to a very few.

SELECTED ARTICLES.

ARTICLE XII.

Teeth—Comparative Anatomy.

(Continued from page 489.)

THE apex of the tooth soon begins to be worn away, and it would appear, by many specimens that have been found, that the teeth were retained until nearly the whole of the crown had yielded to the daily abrasion. In these teeth, however, the deep excavation of the remaining fang, represented in profile in fig. 27, plainly bespeaks the progress of the successional tooth prepared to supply the place of the worn-out grinder.

At the earlier stages of abrasion, a sharp edge is maintained at the external part of the tooth by means of the enamel which covers that surface of the crown. The prominent ridges upon that surface give a sinuous contour to the middle of the cutting edge, whilst its sides are jagged by the lateral serrations. The adaptation of this admirable dental instrument to the cropping and comminution of such tough vegetable food as the *clathrariæ* and similar plants, which are found buried with the iguanodon, is pointed out by Dr. Buckland, with his usual felicity of illustration, in his "Bridgewater Treatise," vol. i, p. 246.

When the crown is worn away beyond the enamel, it presents a broad and nearly horizontal grinding surface, and now another dental substance is brought into use to give an inequal-

ity to that surface; this is the ossified remnant of the pulp, which, being firmer than the surrounding dentine, forms a slight transverse ridge in the middle of the grinding surface. The tooth in this stage has exchanged the functions of an incisor for that of a molar, and is prepared to give the final compression, or comminution, to the coarsely divided vegetable matters.

The marginal edge of the incisive condition of the tooth and the median ridge of the molar stage are more effectually established by the introduction of a modification into the texture of the dentine, by which it is rendered softer than in the existing iguanæ and other reptiles, and more easily worn away: this is effected by an arrest of the calcifying process along certain cylindrical tracts of the pulp, which is thus continued, in the form of medullary canals, analogous to those in the soft dentine of the megatherium's grinder, from the central cavity, at pretty regular intervals, parallel with the calcigerous tubes, nearly to the surface of the tooth. The medullary canals radiate from the internal and lateral sides of the pulp-cavity, and are confined to the dentine forming the corresponding walls of the tooth; their diameter is $\frac{1}{1250}$th of an inch; they are separated by pretty regular intervals, equal to from six to eight of their own diameters; they sometimes divide once in their course. Each medullary canal is surrounded by a clear substance; its cavity was occupied in the section described by a substance of a deeper yellow color than the rest of the dentine.

The calcigerous tubes present a diameter of $\frac{1}{25000}$th of an inch, with interspaces equal to about four of their diameters. At the first part of their course, near the pulp-cavity, they are bent in strong undulations, but afterwards proceed in slight and regular primary curves, or in nearly straight lines, to the periphery of the tooth. When viewed in a longitudinal section of the tooth, the concavity of the primary curvature is turned towards the base of the tooth; the lowest tubes are inclined towards the root, the rest have a general direction at right angles to the axis of the tooth; the few calcigerous tubes,

which proceed vertically to the apex, are soon worn away and can be seen only in a section of the apical part of the crown of an incompletely developed tooth. The secondary undulations of each tooth are regular and very minute. The branches, both primary and secondary, of the calcigerous tubes are sent off from the concave side of the main inflections; the minute secondary branches are remarkable at certain parts of the tooth for their flexuous ramifications, anastomoses, and dilatations into minute calcigerous cells, which take place along nearly parallel lines for a limited extent of the course of the main tubes. The appearance of interruption in the course of the calcigerous tubes, occasioned by this modification of their secondary branches, is represented by the irregularly dotted tracts in the figure of the dental structure of this ancient reptile given in my "Odontography." This modification must contribute, with the medullary canals, though in a minor degree, in producing that inequality of texture and of density in the dentine, which renders the broad and thick tooth of the iguanodon more efficient as a triturating instrument.

The enamel which invests the harder dentine, forming the outer side of the tooth, presents the same peculiar dirty brown color, when viewed by transmitted light, as in most other teeth: very minute and scarcely perceptible undulating fibres, running vertically to the surface of the tooth, is the only structure I have been able to detect in it.

The cement is simply and minutely cellular upon the crown of the tooth, but it exhibits the radiated cells at the base of the tooth.

The remains of the pulp in the contracted cavity of the completely formed tooth, are converted into a dense but true osseous substance, characterised by minute elliptical radiated cells, whose long axis is parallel with the plane of the concentric lamellæ, which surround the few, and contracted medullary canals in this substance.

The microscopical examination of the structure of the iguanodon's teeth, thus contributes additional evidence of the perfection of their adaptation to the offices to which their more obvious characters had indicated them to have been destined.

To preserve a trenchant edge, a partial coating of enamel is applied; and, that the thick body of the tooth might be worn away in a more regularly oblique plane, the dentine is rendered softer as it recedes from the enameled edge, by the simple contrivance of arresting the calcifying process along certain tracts of the inner wall of the tooth. When attrition has at length exhausted the enamel, and the tooth is limited to its functions as a grinder; a third substance has been prepared in the ossified remnant of the pulp, to add to the efficiency of the dental instrument in its final capacity. And if the following reflections were natural and just after a review of the externa lcharacters of the dental organs of the iguanodon, their truth and beauty become still more manifest, as our knowledge of their subject becomes more particular and exact:

"In this curious piece of animal mechanism, we find a varied adjustment of all parts and proportions of the tooth, to the exercise of peculiar functions, attended by compensations adapted to shifting conditions of the instrument, during different stages of its consumption. And we must estimate the works of nature, by a different standard from that which we apply to the productions of human art; if we can view such examples of mechanical contrivance, united with so much economy of expenditure, and with such anticipated adaptations to varying conditions in their application, without feeling a profound conviction, that all this adjustment has resulted from design and high intelligence."

Varanians.—In the great crocodilian monitor *(varanus crocodilinus,)* the large fixed compressed teeth, of which there may be about seven in each upper maxillary bone, and six in each premandibular, are anchylosed by the whole of their base and by an oblique surface leading upwards on the outer side of the tooth to a slight depression on the oblique alveolar surface, as in the *var. striatus.* The base of the tooth is finely striated, the lines being produced by inflected folds of the external cement, as in the ichthyosaur and labyrinthodon, but they are short and straight, as in those of the former genus. The alveolar channel or groove has scarcely any depth; but the

anchylosed base of the tooth is applied to an oblique surface, terminating in a sharp edge, from which the outer side of the free crown of the tooth is directly continued. The great *varanus*, like the variegated species manifests its affinity to the crocodilians in the number of successive teeth which are in progress of growth to replace each other; but from the position in which the germs of the successional teeth are developed, the more advanced teeth in this species, as in the *var. variegatus*, do not exhibit the excavations that characterise the same parts of the teeth of the enaliosaurs and crocodiles.

Thecodonts.—We have seen, that among the inferior or squamate saurians, there are two leading modifications in the mode of attachment of the teeth; the base of which, may be either anchylosed to the summit of an alveolar ridge, or to the bottom of an alveolar groove, and supported by its lateral wall. These modifications are indicated, respectively, by the terms "acrodont" and "pleurodont." A third mode of fixation is presented by some extinct saurians, which, in other parts of their organization, adhere to the squamate or lacertine division of the order, the teeth being implanted in sockets, either loosely or confluent with the bony walls of the cavity; these I have termed the "thecodont" lacertians: the most ancient of all saurians belong to this group; viz. the thuringian monitor, or *protorosaurus*, and the *palæosaurus* of the dolomitic conglomerates near Bristol. The compressed varanian form of tooth, with trenchant and finely dentated margins, which characterised the ancient palœosaur and chadeiodon, is continued in the comparatively more recent and gigantic species of terrestrial lizard, of which the remains were discovered by Dr. Buckland, in the oolite of Stonesfield, by whom, the peculiarities of the jaws and teeth have been accurately and graphically described, in the following words:

"From these remains, we learn, that the animal was a reptile, closely allied to some of our modern lizards; and viewing the teeth as instruments for providing food to a carnivorous creature of enormous magnitude, they appear to have been admirably adapted to the destructive office for which they

have been designed. Their form and mechanism will be best explained by reference to the figures.

The outer margin of the jaw rises nearly an inch above its inner margin, forming a continuous lateral parapet, to support the teeth on the exterior side, where the greatest support was necessary, whilst the inner margin throws up a series of triangular plates of bone forming a zigzag buttress along the interior of the alveoli. From the centre of each triangular plate, a bony partition crosses to the outer parapet, thus completing the successive alveoli. The new teeth are seen in the angle between each triangular plate, rising in reserve to supply the loss of older teeth, as often as progressive growth, or accidental fracture, may render such renewal necessary, and thus affording an exuberant provision for a rapid succession and restoration of these most essential implements. They were formed in distinct cavities, by the side of the old teeth, towards the interior surface of the jaw, and probably, expelled them by the usual process of pressure and absorption, insinuating themselves into the cavities thus left vacant. This contrivance for the renewal of teeth is strictly analogous to that which takes place in the dentition of many species of existing lizards.

In the structure of these teeth, we find a combination of mechanical contrivances analogous to those which are adopted in the construction of the knife, the sabre, and the saw. When first protruded above the gum, the apex of each tooth presented a double cutting edge of serrated enamel. In this stage, its position and line of action were nearly vertical, and its form, like that of the two-edged point of a sabre, cutting equally on each side. As the tooth advanced in growth, it became curved backwards in the form of a pruning-knife, and the edge of serrated enamel was continued downwards to the base of the inner and cutting side of the tooth, whilst on the outer side, a similar edge descended but a short distance from the point, and the convex portion of the tooth became blunt and thick, as the back of a knife is made thick for the purpose of producing strength. The strength of the tooth was further increased by the expansion of its side. Had the serrature continued along

the whole of the blunt and convex portion of the tooth, it would, in this position, have possessed no useful cutting power; it ceased precisely at the point beyond which it could no longer be effective. In a tooth thus formed for cutting along its concave edge, each movement of the jaw combined the power of the knife and saw; whilst the apex, in making the first incision, acted like the two-edged point of a sabre. The backward curvature of the full grown teeth, enabled them to retain, like barbs; the prey which they had penetrated. In these adaptations, we see contrivances which human ingenuity has also adopted in the preparation of various instruments of art.

The teeth of the *megalosaur* consist of a central body of dentine, with an investment of enamel upon the crown, and of cement over all, but thickest upon the fang. The marginal serrations are formed almost entirely by the enamel, and when slightly magnified, are seen to be rounded, and separated by slight basal grooves; the smooth and polished enamel upon the sides of the crown, presents a finely wrinkled appearance; the remains of the pulp are converted into a coarse bone in the completely formed tooth.

Enaliosaurs.—The teeth of the ichthyosauri have a simple, more or less acutely conical form, with a long and, usually, expanded or ventricose base, or implanted fang. They are confined to the intermaxillary, maxillary, and premandibular bones, in which they are arranged in a pretty close and uninterrupted series, and are of nearly equal size. They consist of a body of unvascular dentine, invested at the base by a thick layer of cement, and at the crown by a layer of enamel, which is itself covered by a very thin coat of cement; the pulp-cavity is more or less occupied in fully-formed teeth by a coarse bone. The external surface of the tooth is marked by the longitudinal impressions and ridges, but the teeth vary both as to outward sculpturing and general form in the different species.

The chief peculiarity of the dental system of the ichthyosaur, is the mode of the implantation of the teeth; instead of being anchylosed to the bottom and side of a continuous shallow

groove, as in most lacertians, are implanted in distinct sockets, as in the thecodon, megalosaur, or pterodactyle, they are lodged loosely in a long and deep continuous furrow, and retained by slight ridges between the teeth, along the sides and bottom of the furrow, and by the gum and organized membranes, continued into the groove and upon the base of the teeth.

The germs of the new teeth are developed at the inner side of the base of the old ones.

Crocodilia.—The best and most readily recognizable characters, by which the existing crocodilians are grouped in appropriate genera, are derived from modifications of the dental system.

In the caimans, (genus *alligator*,) the teeth vary in number from $\frac{19}{19}$—$\frac{19}{19}$ to $\frac{22}{22}$—$\frac{22}{22}$: the fourth tooth of the lower jaw, or canine, is *received into a cavity* of the palatal surface of the upper jaw, where it is concealed when the mouth is shut. In old individuals, the upper jaw is perforated by these large inferior canines, and the fossæ are converted into foramina.

In the crocodiles, (genus *crocodilus*,) the first tooth in the lower jaw perforates the palatal process of the premaxillary bone when the mouth is closed; the fourth tooth in the lower jaw is *received into a notch* excavated in the side of the alveolar border of the upper jaw, and is visible externally when the mouth is closed.

In the two preceding genera, the alveolar borders of the jaw have an uneven or wavy contour, and the teeth are of an unequal size.

In the gavials, (genus *gavialis*,) the teeth are nearly equal in size, and similar in form, in both jaws, and the first, as well as the fourth tooth in the lower jaw, passes into a groove in the margin of the upper jaw when the mouth is closed.

In the alligators and crocodiles, the teeth are more unequal in size, and less regular in arrangement, and more diversified in form than in the gavials: witness the strong thick conical laniary teeth as contrasted with the blunt mammillate summits of the posterior teeth in the alligator (fig. 28.) The teeth of the gavial are subequal, most of them present the form of crown, shown in fig. 29, long, slender, pointed, subcompressed

from before backwards, with a trenchant edge on the right and left sides, between which a few faint longitudinal ridges traverse the basal part of the enamelled crown.

Fig. 29

Amongst the remains of crocodilians which are scattered through the tilgate strata, the most common ones are detached teeth, from the difference observable, in the form of which, Dr. Mantell has observed, that "they appear referable to two kinds, the one belonging to that division of crocodiles, with long slender muzzles, named *gavial*, the other to a species of *crocodile*, properly so-called, and resembling a fossil species found at Caen."

Dr. Mantell has obligingly communicated to me figures of well-preserved specimens of both the forms of teeth alluded to, the exactness of which I have recognized by a comparison with the specimens, themselves, in the British Museum.

Teeth in different stages of formation from one alveolus of the gavial: *a* is the base partly absorbed by the pressure of *b*, the successional tooth; below which is figured *c*, the germ of the next tooth to follow.

The tooth, which, from its more slender and acuminated form, approaches nearest to the character of those of the gavial, presents a marked difference, however, from the teeth of any of the recent species of that sub-genus, the crocodilians, as well as from those of the long and slender-snouted extinct genera, called *teleosaurus*, *stineosaurus*, &c. I have described it, therefore, as indicative of a distinct species, under the name of *crocodilus cultridens*. The crown is laterally compressed, subincurved, with two opposite trenchant edges, one forming the concave, the other the convex, outline of the tooth. In the gavial, the direction of the flattening of the crown, and the situation of the trenchant edges are the reverse, the compression being from before backwards, and the edges being lateral.

The tooth of the *crocodilus cultridens*, thus resembles, in form, that of the megalosaur, and perhaps still more those of the argenton crocodile; but I have not observed any specimens of the wealden teeth in which the edges of the crown were serrated, as in both the reptiles just cited. The teeth of the *crocodilus cultridens*, also present a character which does not exist in the teeth of the megalosaur, and is not attributed by Cuvier to those of the *crocodile d'argenton*. The sides of the crown are traversed by a few longitudinal parallel ridges, with regular intervals of about one line, in a crown of a tooth one inch and a half in length: these ridges subside before they reach the apex of the tooth, and more rapidly at the convex than at the concave side of the crown.

Hitherto these teeth have not been found so associated with any part of the skeleton of the same species as to yield further characters of the present extinct crocodilian; but from the above-mentioned well-marked differences between these teeth and those of all the existing species, it is most probable that the extinct crocodile formed the type of a distinct sub-genus, for which the term *suchosaurus* has been proposed.

The second form of tooth having the generic characters of those of the crocodile, which has been discovered in the wealden and approximate strata, is as remarkable for its thick, rounded, and obtuse crown, as the teeth of the preceding species are for their slender, compressed, acute, and trenchant character. It consequently approaches more nearly to the teeth, which characterize the broad and comparatively short-snouted crocodiles; but it differs from these in one of the same characters by which the tooth of the *suchosaurus cultridens* differs from those of the gavials, viz. in the longitudinal ridges which traverse the exterior of the crown. These are, however, more numerous, more close-set, and more neatly defined than in the *suchosaurus cultridens*. Two of the ridges, larger and sharper than the rest, traverse opposite sides of the tooth, from the base to the apex of the crown; they are placed, as in the crocodile and gavial, at the sides of the crown, midway between the convex and concave lines of the curvature of the tooth.

These ridges are confined to the enamel; the cement-covered cylindrical base of the tooth is smooth. The size of the teeth varies from a length of crown of two inches, with a basal diameter of one inch and a half to teeth of one-third of these dimensions. I have proposed to call this extinct crocodile, with biconcave vertebræ, *goniopholis crassidens.*

Development.—In the black alligator of Guiana, the first fourteen teeth of the lower jaw are implanted in distinct sockets, the remaining posterior teeth are lodged close together in a continuous groove, in which the divisions for sockets are faintly indicated by vertical ridges, as in the jaws of ichthyosaurs. A thin compact floor of bone separates this groove, and the sockets anterior to it, from the large cavity of the ramus of the jaw; it is pierced by blood-vessels for the supply of the pulps of the growing teeth, and the vascular dentiparous membrane which lines the alveolar cavities.

Fig. 30.

Section of lower jaw, with four alveoli and teeth of the black alligator.

The tooth-germ is developed from the membrane, covering

the angle between the floor and the inner wall of the socket. It becomes, in this situation, completely enveloped by its capsule, and an enamel-organ is formed at the inner surface of the capsule before the young tooth penetrates the interior of the pulp-cavity of its predecessor.

The matrix of the young growing tooth affects, by its pressure, the inner wall of the socket, as shown in fig. 30, and forms for itself a shallow recess: at the same time it attacks the side of the base of the contained tooth; then, gaining a more extensive attachment by its basis and increased size, it penetrates the large pulp-cavity of the previously formed tooth, either by a circular or semi-circular perforation. The size of the calcified part of the tooth-matrix, which has produced the corresponding absorption of the previously formed tooth on the one side, and of the alveolar process on the other, is represented in the second exposed alveolus of fig. 30, the tooth *a* having been displaced and turned round to show the effects of the stimulus of the pressure. The size of the perforation in the tooth, and of the depression in the jaw, proves them to have been, in great part, caused by the soft matrix, which must have produced its effect by exciting vital action of the absorbents, and not by mere mechanical force. The resistance of the wall of the pulp-cavity having been thus overcome, the growing tooth and its matrix recede from the temporary alveolar depression, and sink into the substance of the pulp contained in the cavity of the fully-formed tooth. As the new tooth grows, the pulp of the old one is removed; the old tooth itself is next attacked, and the crown being undermined by the absorption of the inner surface of its base, may be broken off by a slight external force, when the point of the new tooth is exposed, as in the fig. 30, *b*.

The new tooth disembarrasses itself of the cylindrical base of its predecessor, with which it is sheathed, by maintaining the excitement of the absorbent process so long as the cement of the old fang retains any vital connection with the periosteum of the socket; but the frail remains of the old cylinder, thus reduced, are sometimes lifted off the socket upon the crown of the new tooth, as in fig. 30. *b*, when they are speedily removed

by the action of the jaws. This is, however, the only part of the process which is immediately produced by mechanical force: an attentive observation of the more important previous stages of growth, teaches that the pressure of the growing tooth operates upon the one to be displaced only through the medium of the vital absorbent action which it has excited.

Most of the stages in the development and succession of the teeth of the crocodiles are described by Cuvier with his wonted clearness and accuracy; but the mechanical explanation of the expulsion of the old tooth, which Cuvier adopts from M. Tenon, is opposed by the disproportionate smallness of the hard part of the new tooth to the vacuity in the old one, and by the fact that the matter impressing, viz. the uncalcified part of the walls of the tooth-matrix—is less dense than the part impressed.

No sooner has the young tooth penetrated the interior of the old one, than another germ begins to be developed from the angle between the base of the young tooth and the inner alveolar process, or in the same relative position as that in which its immediate predecessor began to rise, and the processes of succession and displacement are carried on, uninterruptedly, throughout the long life of these cold-blooded carnivorous reptiles.

From the period of exclusion from the egg, the teeth of the crocodile succeed each other in the vertical direction; none are added from behind forwards, like the true molars in mammalia. It follows, therefore, that the number of the teeth of the crocodile is as great when it first sees the light as when it has acquired its full size; and, owing to the rapidity of the succession, the cavity at the base of the fully-formed tooth is never consolidated.

The fossil jaws of the extinct crocodilians demonstrate that the same law regulated the succession of the teeth, at the ancient epoch when those highly organised reptiles prevailed in greatest numbers, and under the most varied generic and specific modifications, as at the present period, when they are reduced to a single family, composed of so few and slightly varied species as to have constituted in the system of Linnæus a small fraction of his genius *lacerta.*

Dental System of Mammals.—The class mammalia, like that of *reptilia* and *pisces*, includes a few genera and species that are devoid of teeth: the true ant-eaters, *(myrmecophaga,)* the scaly ant-eaters, or pangolins, *(manis,)* and the spiny monotrematous ant-eater, *(echidna,)* are examples of strictly edentulous mammals. The *ornithorhynchus* has horny teeth, and the whales *(balæna* and *balænoptera)* have transitory embryonic calcified teeth, succeeded by whalebone substitute in the upper jaw. Horny processes analogous to, perhaps homologous with, the lingual and palatal teeth in fishes, are present in the *echidna.*

The female narwhal seems to be edentulous, but has the germs of two tusks in the substance of the upper jaw-bones; one of these becomes developed into a large and conspicuous weapon in the male narwhal, and accordingly, suggested to Linnæus, the name for its genus, of *monodon*, meaning single tooth; but the tusk is never median, like the truly single tooth on the palate of the myxine; and occasionally both tusks are developed in the narwhal. In another cetacean, the great bottle-nose, or *hyperoodon*, the teeth are reduced in the adult to two in number, whence the specific name *H. bidens*, but they are confined to the lower jaw. The sharp-nosed dolphin (*ziphius*) has also but two teeth, one in each ramus of the lower jaw; and this is, perhaps, a sexual character. The *delphinus griseus* has five teeth on each side of the lower jaw; but they soon become reduced to two Amongst the marsupial animals, the genus *tarsipes* is remarkable for the paucity as well as minuteness of its teeth.

The elephant has never more than one entire molar, or parts of two, in use on each side of the upper and lower jaws; to which are added two tusks, more or less developed in the upper jaw.

Some rodents, as the Australian water-rats, (*hydromys*,) have two grinders on each side of both jaws; which, added to the four cutting teeth in front, make twelve in all: the common number of teeth in this order is twenty; but the hares and rabbits have twenty-eight teeth. The sloth has eighteen teeth.

The number of teeth, thirty-two, which characterises man, the apes of the old world, and the true ruminants, is the average one of the class mammalia; but the typical number is forty-four.

The examples of excessive number of teeth are presented, in the order *bruta*, by the priodont armadillo, which has ninety-eight teeth; and, in the cetaceous order, by the cachalot, which has upwards of sixty teeth, though most of them are confined to the lower jaw; by the common porpoise, which has between eighty and ninety teeth; by the gangetic dolphin, which has one hundred and twenty teeth; and by the true dolphins, (*delphinus*,) which has from one hundred to one hundred and ninety teeth, yielding the maximum number in the class mammalia.

Form.—Where the teeth are in excessive number, as in the species above cited, they are small, equal, or sub-equal, and of a simple conical form; pointed, and slightly recurved in the common dolphin; with a broad and flattened base in the gangetic dolphin, (*inia*;) with the crown compressed, and broadest in the porpoise; compressed, but truncate, and equal with the fang, in the priodon. The compressed triangular teeth become coarsely notched or dentated, at the hinder part of the series, in the great extinct cetaceous *zeuglodon*. The simple dentition of the smaller armadillos, of the orycterope, and of the three-toed sloth, presents a difference in the size, but little variety in the shape of the teeth, which are subcylindrical, with broad triturating surfaces; in the two-toed sloth, the two anterior teeth of the upper jaw are longer and larger than the rest, and adapted for piercing and tearing.

In almost all the other mammalia, particular teeth have special forms for special uses: thus, the front teeth, from being commonly adapted to effect the first coarse division of the food, have been called cutters or *incisors*; and the back teeth, which complete its comminution, grinders, or *molars*; large conical teeth, situated behind the incisors, and adapted by being nearer the insertion of the biting muscles, to act with greater force, are called holders, tearers, laniaries, or more commonly *canine* teeth, from being well developed in the dog and other carniv-

oro, although they are given, likewise, to many vegetable feeders for defence or combat: *e. g.* musk-deer, (fig. 36, vii.) Molar teeth, which are adapted for mastication, have either tuberculate, or ridged, or flat summits; and usually are either surrounded by a fence of enamel, or are traversed by enamel plates arranged in various patterns. Certain molars in the dugong, the mylodon, and the zeuglodon, are so deeply indented laterally by opposite longitudinal grooves, as to appear, when abraded, to be composed of two cylindrical teeth cemented together, and the transverse section of the crown is bilobed. The teeth of the *glyptodon* were fluted by two analogous grooves on each side. The large molars of the capybara and elephant have the crown cleft into a numerous series of compressed transverse plates, cemented together side by side.

The teeth of the mammalia have usually so much more definite and complex a form than those of fishes and reptiles, that three parts are recognised in them: viz. the "fang," the "neck," and the "crown." The fang or root (*radix*) is the inserted part; the crown (*corona*) the exposed part; and the construction which divides these is called the neck (*cervix.*) The term "fang" is properly given only to the implanted part of a tooth of restricted growth, which fang gradually tapers to its extremity; those teeth which grow uninterruptedly have not their exposed part separated by a neck from their implanted part, and this generally maintains to its extremity the same shape and size as the exposed crown.

It is peculiar to the class mammalia to have teeth implanted in sockets by two or more fangs; but this can only happen to teeth of limited growth, and generally characterises the molars and premolars; perpetually growing teeth require the base to be kept simple, and widely excavated for the persisting pulp. In no mammiferous animal does anchylosis of the tooth with the jaw constitute a normal mode of attachment. Each tooth has its particular socket, to which it firmly adheres by the close co-adaptation of their opposed surfaces, and by the firm adhesion of the alveolar periosteum to the organised cement which invests the fang or fangs of the tooth; but in some of the

cetacea, at the posterior part of the dental series, the sockets are wide and shallow, and the teeth adhere more strongly to the gum than to the periosteum; in the cachalot, I have seen all the teeth brought away with the ligamentous gum, when it has been stript from the sockets of the lower jaw.

Teeth are fixed as a general rule in all vertebrata, and the only known exceptions are those presented by certain species of fishes, *e. g.* the sharks, lophioids, goniodonts. In the higher vertebrata, the movements of the teeth depend on those of the jaw bones to which they are affixed, but appear to be independent in the ratio of the size of the tooth to the bone to which it is attached. Thus, the extent of rotatory movement to which the large perforated poison fangs of the rattlesnake are subject, depends upon the rotation of the small maxillary bone. So, likewise, the seemingly individual movements of divarication and approximation observable in the large lower incisors of the *bathyergus* and *macropus*, are due entirely to the yielding nature of the symphysis uniting the two rami of the lower jaw in which those incisors are deeply and firmly implanted. It is no more a property of the teeth themselves than is that alternate removal of the lower teeth from, and bringing of them in contact with the upper teeth of the mouth, which one sees or feels in the act of mastication.

True teeth implanted in sockets, are confined in the mammalian class, to the maxillary, pre-maxillary, and mandibular, or lower maxillary bones, and form a single row in each. They may project only from the pre-maxillary bones, as in the narwhal, or only from the lower maxillary bone, as in ziphius; or be apparent only in the lower maxillary bone, as in the cachalot; or be limited to the superior and inferior maxillaries, and not present in the premaxillaries, as in the true *pecora*, and most *bruta* of Linnæus; in general, teeth are situated in all the bones above mentioned. In man, where the premaxillaries early coalesce with the maxillary bones, where the jaws are very short, and the crowns of the teeth are of equal length, there is no interspace or "diastema" in the dental series of either jaw, and the teeth derive some additional fixity by their

close apposition and mutual pressure. No inferior mammal now presents this character; but its importance, as associated with the peculiar attributes of the human organization, has been somewhat diminished by the discovery of a like contiguous arrangement of the teeth in the jaws of a few extinct quadrupeds: e. g. *anoplotherium*, *nesodon* and *dichodon*.

The teeth of the mammalia usually consist of hard unvascular dentine, defended at the crown by an investment of enamel, and everywhere surrounded by a coat of cement. The coronal cement is of extreme tenuity in man, quadrumana, and terrestrial carnivora; it is thicker in the herbivora, especially in the complex grinders of the elephant; and is thickest in the teeth of the sloths, megatherioids, dugong, walrus and cachalot. Vertical folds of enamel and cement penetrate the crown of the tooth in the ruminants, and in most rodents and pachyderms, characterises by their various forms the genera of the last two orders; but these folds never converge from equidistant points of the circumference of the crown towards its centre. The teeth of the quadrupeds of the order *bruta (edentata*, Cuv.*)* have no true enamel; this is absent likewise in the molars of the dugong and the cachalot. The tusks of the narwhal, walrus, dinotherium, mastodon and elephant, consist of modified dentine, which, in the last two great proboscidian animals, is properly called "ivory," and is covered by cement.

In the subjoined magnified view of a section of the molar of a megatherium, *t* is the hard dentine, *v* the vaso-dentine, and *c* the cement (fig. 31.)

The teeth in the mammalia, as in the aforegoing classes, are formed by superaddition of the hardening salts to pre-existing moulds of animal pulp or membrane, organised so as to insure the arrangement of the earthy particles according to that pattern which characterizes each constituent texture of the tooth.

The complexity of the primordial basis or matrix, corresponds, therefore, with that of the fully formed tooth, and is least remarkable in those conical teeth which consist only of dentine and cement. The primary pulp, which first appears as a papilla rising from the free surface of the alveolar gum, is

the part of the matrix which by its calcification constitutes the dentine; it sinks into a cell, and becomes surrounded by a

FIG. 31.

closed capsule in every mammiferous species, at an early stage of the formation of the tooth; and, as the cement is the result of the ossification of the capsule, every tooth must be covered by a layer of that substance. In those teeth which possess enamel, the mould or pulp of that constituent, is developed from the capsule covering the coronal part of the dentinal pulp. In the simple teeth, the secondary or enamel pulp covers the crown like a cap; in the complex teeth, it sends processes into depressions of the crown, which vary in depth, breadth, direction, and number in the numerous groups of the herbivorous and omnivorous quadrupeds. The dentinal pulp, thus penetrated, offers corresponding complications of form; and as the capsule follows the enamel pulp in all its folds and processes, the external cavities or interspaces of the dentine become occupied by enamel and cement; the cement, like the capsule which formed it, being the outermost substance, and the enamel being interposed between it and the dentine. The dental matrix presents the most extensive interdigitation of the dentinal and enamel pulps in the capybara and elephant.

The matrix of the mammalian tooth sinks into a furrow and and soon becomes inclosed in a cell in the substance of the jaw bone, from which the crown of the growing tooth extricates itself by exciting the absorbent process, whilst the cell is

deepened by the same process, and by the growth of the jaw into an alveolus for the root of the tooth. Where the formative parts of the tooth are re-produced indefinitely to repair by their progressive calcification the waste to which the working surface of the crown of the tooth has been subject, the alveolus is of unusual depth, and of the same form and diameter throughout, except in the immature animal, when it widens to its bottom or base. In teeth of limited growth, the dentinal pulp is re-produced in progressively decreasing quantity after the completion of the exterior wall of the crown, and forms by its calcification one or more roots or fangs, which taper more or less rapidly to their free extremity. The alveolus is closely moulded upon the implanted part of the tooth; and it is worthy of special remark, that the complicated form of socket which results from the development of two or more fangs, is peculiar to animals of the class mammalia.

In the formation of a single fang, the activity of the re-productive process becomes enfeebled at the circumference, and is progressively contracted within narrower limits in relation to a single centre, until it ceases at the completion of the apex of the fang; which, though for a long time perforated for the admission of the vessels, and nerves to the interior of the tooth, is, in many cases, finally closed by the ossification of the remaining part of the capsule.

When a tooth is destined to be implanted by two or more fangs, the re-production of the pulp is restricted to two or more parts of the base of the coronal portion of the pulp, around the centre of which parts the sphere of its re-productive activity is progressively contracted. The intervening parts of the base of the coronal pulp adhere to the capsule, which is simultaneously calcified with them, covering those parts of the base of the crown of the tooth with a layer of cement. The ossification of the surrounding jaw being governed by the changes in the soft, but highly organized, dental matrix, fills up the spaces unoccupied by the contracted and divided pulp, and affords, by its periosteum, a surface for the adhesion of the cement or ossified capsule covering the completed part of the tooth.

The matrix of certain teeth does not give rise during any period of their formation to the germ of a second tooth, destined to succeed the first; this, therefore, when completed and worn down, is not replaced: all the true cetacea are limited to this simple provision of teeth. In the armadillos, megatherioids, and sloths, the want of germinative power, as it may be called, in the matrix, is compensated by the persistence of the matrix, and by the uninterrupted growth of the teeth.

In most other mammalia, the matrix of the first developed tooth gives origin to the germ of a second tooth, which sometimes diplaces, sometimes takes its place by the side of its predecessor and parent. All those teeth which are displaced by their progeny, are called temporary, deciduous, or milk teeth; the mode and direction in which they are displaced and succeeded, viz. from above downwards in the upper, from below upwards in the lower jaw; in both jaws vertically—are the same as in the crocodile; but the process is never repeated more than once in any mammiferous animal. A considerable proportion of the dental series is thus changed; the second, or permanent teeth, having a size and form as suitable to the jaws of the adult, as the displaced temporary teeth were adapted to those of the young animal. The permanent teeth, which assume places not previously occupied by deciduous ones, are always the most posterior in their position, and generally the most complex in their form. The successors of the deciduous incisors and canines differ from them chiefly in size; the successors of the deciduous molars may differ likewise in shape, in which case they have always less complex crowns than their predecessors.

The "bicuspids," in human anatomy, and the corresponding teeth, called "premolars," in the lower mammals, illustrate this law.

The first true molar owes the germ of its matrix to a vegetation or bud, separated by the fissiparous process from the matrix of the last deciduous tooth; but the backward elongation of the jaw affords space for its development by the side of its progenitor, during which process it may, in like manner,

give origin to a second, and this to a third molar, succeeding each other from before backwards or horizontally.

In this successive germ-production, we find repeated the multiparous property of the dental matrix of the crocodile; but the concomitant growth of the jaw allows the second, third, and sometimes fourth generation of true molars to co-exist, and come into place side by side. In the unguiculate, and most of the ungulate, species of the placental division of the mammalian class, the fissiparous reproduction of horizontally succeeding teeth, stops at the third generation; in other words, they have not more than three true molars on each side of the upper and lower jaws. In the marsupial series, the same process extends to a fourth generation of true or horizontally succeeding molars; and in most of the species, the four true molars are in use and place at the same time; but in certain kangaroos, the anterior ones are shed before the posterior ones are developed. This successive decadence is still more characteristic of the grinding teeth of the elephant, which are finally reduced to a single molar tooth on each side of both jaws.

Thus the class mammalia, in regard to the times of formation and the succession of the teeth, may be divided into two groups:—the "*monophyodonts*," or those that generate a single set of teeth; and the "*diphyodonts*," or those that generate two sets of teeth.

The monophyodonts include the orders *monotremata*, *bruta*, (*edentata*, Cuv.,) and (*cetacea vera*, Cuv.:) all the rest of the order are diphyodonts. In these, the first set of teeth are called the milk or deciduous teeth: the second set, the adult or permanent teeth; although the teeth of this set are, for the most part, like those of the first set, of limited growth, contracting to a root or roots, and being shed in greater or less proportion during the life-time of the species; which life-time, in wild carnivora and herbivora, is dependent on, and would seem, indeed, to be determined by, the duration of the adult teeth.

Examples of some of the striking modifications of dental structure, presented by recent or extinct animals of the order,

bruta, are given in figs. 6, and 31, of the present article. It will be observed that I have qualified the generalization as regards the monophyodont character of the *cetacea*, by citing only that part of Cuvier's order which he termed "true or carnivorous cetacea." The animals of the order *sirenia*, (herbivorous cetacea of Cuvier,) differ in many organic particulars from the *cetacea* proper, and in none, perhaps, more strikingly than in having both deciduous and permanent teeth; this succession takes place, at least, with regard to the upper incisors of the *dugong*, fig. 32.

Fig. 32.

Dentition of the Dugong (Halicore indicus.)

These teeth project from the gum in the male sex; but neither upper nor lower incisors are visible in the female. The superior incisors are but two in number, in both sexes; in the male, they are moderately long, subtriedral, slightly and equally curved, of the same diameter from the base, and deeply excavated to near the apex, which is obliquely beveled off to a sharp edge, like the scalpriform teeth of the *rodentia*. When fully developed, only the extremity of the tusk projects from the jaw, at least seven-eighths of its extent being lodged in the socket, the parietes of which are entire; and the exterior of

the great premaxillary bones presents an unbroken surface. In the female dugong, the growth of the permanent incisive tusks of the upper jaw is arrested before they cut the gum, and they remain, through life, concealed in the premaxillaries; the tusk is solid, is about an inch shorter and less bent than that of the male; it is also irregularly cylindrical, longitudinally indented, and it gradually diminishes to an obtuse rugged point; the base is suddenly expanded, bent obliquely outwards, and presents a shallow excavation. These were conjectured, by Home, to be the "milk-tusks;" they are, however, characteristic of sex, not of age; and the existence of deciduous tusks at any period in the dugong has been called in question. I have, however, discovered in specimens of the Malayan dugong, which I have dissected at the Zoological Society, the true deciduous incisors of the upper jaw (fig. 32, *d i*) co-existing with the permanent ones (*i.*) They are much smaller than the permanent tusks of the female, and are loosely inserted by one extremity, in conical sockets, immediately anterior to those of the permanent tusks, adhering, by their opposite ends, to the thick, tegumentary gum, which presented no outward indication of their presence.

When this gum was stripped off the bone, the deciduous tusks came away with it; and this may account for their usual absence in dried crania of immature dugongs, in which, nevertheless, their alveoli are generally sufficiently conspicuous. True permanent incisors are not developed in the lower jaw of the dugong; those which are occasionally found there, are abortive remnants of the first, or deciduous series, which are not destined at any time to rise above the gum (fig. 32, *d i* 3.)

The molar teeth of the dugong resemble those of the order *bruta*, in the total absence of enamel, and of any constriction defining the crown from the fangs. In the Malayan species, only five molars (fig. 32, 1, 2, 3, 4, 5,) are developed on each side of both jaws: in the Australian dugong, six are developed; *i. e.* the *halicore indicus* is characterized by the molar formula *m.* $\frac{5-5}{5-5}=20$, whilst the *halicore australis* has *m.* $\frac{6-6}{6-6}=24$. But in both species, the number is progressively reduced, by the shed-

ding of the anterior and smaller molars, to *m.* $\frac{2-2}{2-2}=8$. The structure of these molar teeth is illustrated in fig. 4, B, their form in fig. 4, A; the last molar, when it comes into use, presents a bilobed form of grinding surface, as is shown at *b*, fig. 32.

Owing to there being but one set of molars in the dugong, those teeth cannot be divided into true and false molars, any more than in the sloths or armadillos. In the true diphyodonts, in which each kind of teeth have deciduous predecessors, those grinders which succeed the deciduous ones vertically, and displace them, are called "premolars," or "false molars," and those that come into place behind these, without pushing out vertically any predecessors, are the "molar proper," or "true molars." In this article, the two sorts of grinders are called respectively "premolars" and "molars." In the marsupial order the normal number of molars is four in each dental series, *i. e. m.* $\frac{4-4}{4-4}$; in the placental diphyodonts there normal number is three, *i. e. m.* $\frac{3-3}{3-3}$; the normal number of premolars in the marsupialia is $\frac{3-3}{3-3}$, but in the placentalia, it is $\frac{4-4}{4-4}$: in both the numerical character of the canines is one, *i. e.* $\frac{1-1}{1-1}$; that of the incisors three, *i. e.* $\frac{3-3}{3-3}$. As regards the latter teeth, however the number of exceptions in the *marsupialia* is considerable, and the incisors are sometimes in excess; whilst in the placental diphyodonts, the incisors never exceed the typical number, but frequently depart from it by suppression or arrest of development.

In fishes and reptiles, certain teeth might be called "incisive," "laniary," or "molar" teeth, in reference to the special adaptation of their form for cutting, tearing, or bruising; but such terms, in the cold-blooded classes, imply nothing more than those modifications of form; they are not significative of constant and well defined groups of teeth, and could not become the names of definite parts or organs determinable and traceable from one species to another. In the mammalian orders, with two sets of teeth, these organs acquire fixed individual characters, receive special denominations, and can be determined from species to species. This individualization of the teeth is eminently significative of the high grade of organiza-

tion of the animals manifesting it; especially when we consider the great proportion of mineral substance which enters into the composition of those parts; in the number and nature of which the principle of vegetative repetition, and the power of the general polarising forces, have been most controlled in the mammalia.

Originally, indeed, the name "incisors," "laniaries," or "canines," and "molars" were given to the teeth, in man and certain mammals, as in reptiles, in reference merely to the shape and offices so indicated; but they are now used as arbitrary signs, in a more fixed and determinate sense. In some carnivora, *e. g.*, the front teeth have broad tuberculate summits, adapted for nipping and bruising, while the principal back teeth are shaped for cutting, and work upon each other like the blades of scissors. The front teeth in the elephant project from the upper jaw, in the form, size, and direction of long pointed horns. In short, shape and size are the least constant of dental characters in the mammalia: and the homologous teeth are determined, like other parts, by their relative position, by their connections, and by their development.

Those teeth which are implanted in the premaxillary bones, and in the corresponding part of the lower jaw, are called "incisors," whatever be their shape or size. The tooth in the maxillary bone, which is situated at, or near to, the suture with the premaxillary, is the "canine," as is also that tooth in the lower jaw which, in opposing it, passes in front of its crown when the mouth is closed. The other teeth of the first set are the "deciduous molars:" the teeth which displace and succeed them vertically are the "premolars;" the more posterior teeth, which are not displaced by vertical successors, are the "molars" properly so called.

When the premolars and the molars are below their typical number, the absent teeth are missing from the forepart of the premolar series, and from the back part of the molar series. The most constant teeth are the fourth premolar and the first true molar; and, these being known by their order and mode of development, the homologies of the remaining molars and premolars are determined by counting the mo-

lars from before backwards, *e. g.* "one," "two," "three" and the premolars from behind forwards, *e. g.* "four," "three," "two," "one." The incisors are counted from the median line, commonly the foremost part of both upper and lower jaws, outwards and backwards. The first incisor of the right side is the homotype, transversely, of the contiguous incisor of the left side in the same jaw, and, vertically, of its opposing tooth in the opposite jaw; and so with regard to the canines, premolars, and molars; just as the right arm is the homotype of the left arm in its own segment, and also of the right leg of a succeeding segment. It suffices, therefore, to reckon and name the teeth of one side of either jaw in a species with the typical number and kinds of teeth; *e. g.* the first, second, and third incisors, the first, second, third and fourth premolars; the first, second, and third molars; and of one side of both in jaws in any case.

The homologous teeth being thus determinable, they may be severally signified by a symbol as well as by a name. The incisors, *e. g.*, by their initial letter *i*, and individually by an added number, *i.* 1, *i.* 2, and *i.* 3; the canines by the letter *c.*; the premolars by the letter *p.*; and the molars by the letter *m.*; these also being differentiated by added numerals. Thus, the number of these teeth, on each side of both jaws, in any given species, man *e. g.*, may be expressed by the following brief formula:—*i.* $\frac{2}{2}-\frac{2}{2}$, *c.* $\frac{1}{1}-\frac{1}{1}$, *p.* $\frac{2}{2}-\frac{2}{2}$, *m.* $\frac{3}{3}-\frac{3}{3}=32$; and the homo logies of the individual teeth, in relation to the typical formula, may be signified by *i.* 1., *i.* 2.; *c.*; *p.* 3.; *m.* 1., *m.* 2., *m.* 3.: the suppressed teeth being *i.* 3., *p.* 1., and *p.* 2.

Examples of the typical dentition are exceptions in the actual creation but it was the rule in the forms of mammalia first introduced into this planet; and that, too, whether the teeth were modified for animal or vegetable food. Fig. 33, *e. g.*, shows the dental series of the upper jaw of the *amphicyon major*, a mixed-feeding ferine animal, allied to the bear.

Figure 34 shows the dental series of the under jaw of a more strictly carnivorous beast, the *hyænodon;* the fossil remains of a species of which have been discovered in the oldest

Fig. 33.

Dentition of the Amphicyon major. Upper jaw.

tertiary deposits of Hampshire. The symbols denote the homologies of the teeth. The true molars in the one are tuberculate, indicating its tendency to vegetable diet; in the other, they are carnassial, and betoken a peculiarly destructive and bloodthirsty species.

Fig. 34.

Dentition of the Hyænodon. Lower jaw.

In the Quarterly Geological Journal, No. 13, 1848, p. 36. pl. iv., I have described and figured the entire dental series of one side of the lower jaw of an extinct hoofed quadruped, the *dichodon cuspidatus*, from eocene or oldest tertiary strata also manifesting the normal number and kinds of teeth, but with

such equality of height of crown, that no interspace is needed to lodge any of the teeth when the jaws are closed, and the series is as entire and uninterrupted as in the human subject. A great proportion of the upper jaw and teeth has been discovered, and the marks of abrasion on the lower teeth prove the series above to have been as entire and continuous as that below. The *anoplotherium*, from the gypsum quarries of Montmartre, geologically as ancient as the eocene clays of this island, long ago presented to Cuvier the same peculiar continuous dental series as is shown in the *dichodon*. In his original memoir, Cuvier described the canines as a fourth pair of incisors, on account of their small size and their trenchant shape; but he afterwards recognised their true homology with the larger and more laniariform canines of the *palæotherium*. The *chæropotamus*, the *anthracotherium*, the *hyopotamus*, the *hyracotherium*, the *oplotherium*, the *merycopotamus*, the *hippohyus*, and other ancient (eocene and miocene) tertiary mammalian genera presented the forty-four teeth, in number and kind according to that which is here propounded as the typical or normal dentition of the placental mammalia. Amongst the existing genera, the hog (*sus*) is one of the few that retain this type.

Fig. 35.

Dentition of the Hog (Sus.)

Figure 35, shows the entire permanent series, exposed in both jaws, and indicated individually by their symbols. Fig. 36 illustrates the phenomena of development which distinguish the premolars from the molars. The first premolar, *p.* 1, and

Fig. 36.

Deciduous and permanent teeth (Sus.)

the first molar *m.* 1, are in place and use, together with the three deciduous molars, *d.* 2, *d.* 3, and *d.* 4; the second molar, *m.* 2, has just begun to cut the gum; *p.* 2, *p.* 3, and *p.* 4, together with *m.* 3, are more or less incomplete and concealed in their closed alveoli.

The premolars must displace deciduous molars in order to rise into place; the molars have no such relations; it will be observed, that the last deciduous molar, *d.* 4, has the same relative superiority of size to *d.* 3 and *d.* 2 which *m.* 3 bears to *m.* 2, and *m.* 1; and the crowns of *p.* 3 and *p.* 4 are of a more simple form than those of the milk-teeth which they are destined to succeed.

Teeth of each of the kinds above determined, and arbitrarily named "incisors," "canines," "premolars," "molars," have received other special names in regard to certain peculiarities of form or other property; and the ablest comparative anatomists have been led astray in determining their homologies when they have suffered themselves to be guided exclusively by morphological characters. The premolars in the human subject have been called "bicuspids." The last upper premolar and the first lower true molar in the carnivora are termed,

from their peculiar form, "sectorials," or "carnassial teeth," "molaires carnassières" of Cuvier. Teeth of and elongated conical form, projecting considerably beyond the rest, and of uninterrupted growth, are called "tusks;" such are the incisors of the elephant and dugong, the canines of the boar and walrus: the long and large incisors of the rodents have been termed, from the shape and structure of their cutting edge, scalpriform or chisel-teeth, "*dentes scalpararii.*" The inferior incisors of the flying lemurs (*galeopithecus*) have the crown deeply notched like a comb, and are termed, "*dentes pectinati.*" The canines of the baboons are deeply grooved in front, like the poison-fangs "*dentes canaliculati,*" of some serpents. The compressed conical crowns of the molar teeth of the small clawed seals (*stenorhynchus*) are divided either like a trident, into three sharp points, or like a saw, into four or five points; the molars of the great extinct *zeuglodon* had a similar form; such teeth have been called *dentes serrati.* But the philosophical course of the knowledge of nature tends to explode needless terms of art, invented for unimportant varieties, and to establish and fix the meaning of those terms that are the signs of determinate species of things.

The Cuviers divided the molar series of teeth, according to their form, into three kinds: "false molars," "carnassials," and "tubercular molars;" and, in giving the generic characters of mammalia, based the dental formulæ on this system: thus the genus *felis* is characterised as having "fauses molaires $\frac{2}{2}$—$\frac{2}{2}$, carnassières $\frac{1}{1}$—$\frac{1}{1}$, tuberculeuses $\frac{1}{1}$—$\frac{1}{1}$; $=\frac{4}{4}$."

The uninterrupted line marked "Cuvier" in V. felis of fig. 37, intersects the teeth in each jaw called called carnassières; those anterior to them being the teeth called "fausses molaires;" the single tooth behind in the upper jaw is the "tuberculeuse." Most zoologists, both at home and abroad, have adopted the Cuvierian system of formalising the molar teeth. It seems a very natural one in the case of the cat genus; the tooth *p.* 4 above plays upon that, *m.* 1, below, which has a similar remarkable carnassial modification of form; they fit, indeed, almost as Cuvier describe, like the blades of a pair of

Fig. 37.

Homologies of the teeth in Diphyodont Mammals.

Homo.

Ursus.

Canis.

Mustela.

Felis.

Machairodus

Moschus.

Cuvier. De Bl.

scissors; the two teeth in advance of the carnassial in the upper jaw (*p*. 3, *p*. 2) in like manner are opposed to the same number of "fausses molaires" (*p*. 4, *p*. 3) in the under jaw, and the canine *c*. above plays upon the canine below; all seems straightforward and symmetrical, save that the little tubercular, *m*. 1, above has no opponent in the lower jaw. And, perhaps, the close observer might notice that whilst the upper canine, *c*., glides behind its homotype below, the first upper false molar (*p*. 2) passes anterior to the crown of the first false molar (*p*. 3) below; and that the second false molar and carnassial of the upper jaw are also a little in advance of those teeth in the under jaw when the mouth is shut.

In passing to the dentition of the dog (fig. 37, canis,) formulised by Cuvier, as: "fausses molaires $\frac{3}{4}\frac{-}{-}\frac{3}{4}$, carnassières $\frac{1}{1}\frac{-}{-}\frac{1}{1}$, tuberculeuses $\frac{2}{2}\frac{-}{-}\frac{2}{2} = \frac{12}{14}$ it will be observed, that here the first upper false molar (*p*. 1,) differs from that in *felis*, inasmuch, as when the mouth is shut, it preserves the same relative position to its opponent below (*p*. 1,) which the upper canine does to the lower canine, and that the same may be said of the second and the third false molars; but that with regard to the carnassial above (*p*. 4,) this tooth repeats the same relative position in regard to the fourth false molar below (*p*. 4,) and not to that tooth, *m*. 1, which Cuvier regarded as the lower homotype of the carnassial; and, indeed, the more backward position of the lower carnassial is so slight, that its significance might well be overlooked, more especially, as the two succeeding tubercular teeth above were opposed to two similar tuberculars below. Cuvier, therefore, leaves us to conclude, that the tooth which had no homotype or answerable opponent above, was either the fourth "fausse molaire" below, or else the first. How unimportant size and shape are, and how significant relative position is in the determination of the homologies of teeth as of other parts, may be learnt before quitting the natural order of carnivora; *e. g*. by the condition of the dental system in the bear (fig. 37, ii. Ursus.) Here the lower tooth, *m*. 1, instead of presenting the carnassial character and resembling in form the upper tooth, (*p*. 4,) which is the

homologue of the upper carnassial in the dog, has a tubercular crown, and corresponds in size as well as shape with the upper tooth *m.* 1, to which it is almost wholly opposed, and with the same slight advance of position which we observe in the lower canine as compared with the upper one, and in the four lower premolars, (*p.* 1, *p.* 2, *p.* 3, *p.* 4,) as compared with their veritable homotypes above. F. Cuvier divides the molar series of the genus *ursus* into "fausses molaires, $\frac{3-3}{4-4}$, carnassières $\frac{1-1}{1-1}$, tuberculeuses $\frac{2-2}{2-2} = \frac{12}{14}$." The tendency in every thinker to generalise and to recognize nature's harmonies, has led him here to use the term "carnassière" in an arbitrary sense, and to apply it to a tooth above (*p.* 4,) which he owns has such a shape and diminished size, as would have led him to regard it as merely a false molar, but, that the upper carnassial would then have entirely disappeared; and it has also led him to give the name "carnassière" to a tooth below, *m.* 1, which he, nevertheless, describes as having a tubercular and not a trenchant crown. In so natural a group as the true carnivora, it was impossible to overlook the homologues of the trenchant carnassials of the lion, even when they had become tubercular in the omnivorous bear; and Cuvier, therefore, having determined and defined the teeth, so called in the feline genus, felt compelled to distinguish them by the same names after they had lost their specific formal character. And if, indeed, he had succeeded in discovering the teeth which were truly answerable or homotypal in the upper and lower jaws, the term "carnassial" might have been retained as an arbitrary one for such teeth, and have been applied to their homologues in man, the ruminant, or the pachyderm, where they are as certainly determinable as in those aberrant carnivores, in which they have equally lost their sectorial shape. But the inconvenience of names indicative of such specialties of form will be very obvious when the term "tuberculeuses" comes to be applied to the three hindmost teeth in the *hyænodon*, (fig. 34,) which teeth answer to the broad crushing teeth, *m.* 1, *m.* 2, and *m.* 3, in the bear and some other existing carnivora. The analogous term "molar," having a less direct or descriptive meaning, is there-

fore, so much the better as the requisite arbitrary name of a determinate species of teeth.

Had Cuvier been guided in his determinations of the teeth by their mutual opposition in the closed mouth, and had studied them with this view in the carnivora, with the dentition most nearly approaching to the typical formula, viz. the bear, he could then have seen that the three small and inconstant lower premolars (*p.* 1, *p.* 2, *p.* 3,) were the homotypes of the three small and similarly inconstant premolars above; that the fourth false molar (*p.* 4) below, which, as he observes, "alone has the normal form," was truly the homotype of the tooth above, (*p.* 4,) which he found himself compelled to reject from the class of "fausses molaires," notwithstanding it presented their normal form; that the turbercular tooth, *m.* 1, which he calls "carnassière" in the lower jaw, was the veritable homotype of his first "molaire tuberculeuse" above (*m.* 1,) and that the tooth in the inferior series which had no answerable one above was his second "tuberculeuse," (my *m.* 3,) and not any of the four false molars. The true second tubercular above (*m.* 2) is, however, so much developed in the bear as to oppose both *m.* 2 and *m.* 3 in the lower jaw, and it might seem to include the homotypes of both those teeth coalesced. One sees with an interest such as only these homological researches could excite, that they were distinctly developed in the ancient *amphicyon*, (fig. 33,) which accordingly presents the typical formula. Thus, I repeat, the study of the relative position of the teeth of the bear might have led to the recognition of their real nature and homologies, and have helped to raise the mask of their extreme formal modifications, by which they are adapted to the habits of the more blood-thirsty carnivora. But the truth is plainly and satisfactorily revealed, when we come to trace the course of development and succession of these teeth. The weight which must ever attach itself to an opinion sanctioned by the authority of both the Cuviers, demands, that a conclusion contrary to theirs, and which seems to be opposed by nature herself, in certain instances, should be supported by all the evidence of which such conclusion is susceptible.

I proceed, therefore, to show how, in the bear, my determinations of the teeth are established by their development, as well as by their relative position. As the question only concerns the molar series, the remarks will be confined to these. In the jaws of the young bear, figured in cut 38, the first pre-

Fig. 38.

Deciduous and permanent dentition of the Bear (Ursus.)

molar, *p.* 1, is the only one of the permanent series in place; the other grinders in use, are the deciduous molars, *d.* 2, *d.* 3, and *d.* 4; *d.* 2 will be displaced by *p.* 2, *d.* 3 by *p.* 3, and *d.* 4, by the tooth, *p.* 4, which, notwithstanding its size and shape, Cuvier felt himself compelled to discard from the series of false molars; but which we now see, is proved by its developmental relations to *d.* 4, as well as by its relative position and similarity to *p.* 4 in the lower jaw, (fig. 37, Ursus,) to be veritably the last of the premolar series, and to agree not in shape only, but in every essential character, with the three preceding teeth called by Cuvier "fausses molaires." So, likewise, in the lower jaw, we see, that the primitive deciduous series, *d.* 1, *d.* 2, *d.* 3 and *d.* 4, will be displaced by the corresponding pre-

molars, *p.* 1, *p.* 2, *p.* 3 and *p.* 4; and that the tooth *m.* 1, called carnassière by Cuvier, in the lower jaw, differs essentially from that *p.* 4, so called in the upper jaw by being developed without any vertical predecessor or deciduous tooth.

The same law of development and succession prevails in the genus *canis* (fig. 38.) Although the tooth *m.* 1, in the lower jaw, has exchanged the tubercular for the carnassial form, it is still developed, as in the bear, behind the deciduous series, and independently of any vertical predecessor; and the tooth *p.* 4 above, although acquiring a relative superiority of size to its homologue in the bear, and more decidedly a carnassial form, is not the homotype of the permanent carnassial below, but of that premolar (*p.* 4,) which is destined to displace the deciduous carnassial, *d.* 4. The symbols sufficiently indicate the relations of the other teeth, and the conclusions that are to be drawn from them as to their homologies. It is interesting to observe in the deciduous, as well as in the permanent series, that the lower carnassial *d.* 4, is not the homotype of the upper one, *d.* 3, but of the tooth which Cuvier calls the "tuberculeuse du lait," *d.* 4 in the upper jaw.

In the genus *felis*, (fig. 37,) the small permanent tubercular molar of the upper jaw, *m.* 1, has cut the gum before its analogue *d.* 3, of the deciduous series has been shed; but though analogous in function, this is not homologous with, or the precedent tooth to *m.* 1; but, as in the dog, to the great carnassially modified premolar, *p.* 4. In the lower jaw the tooth (*m.* 1,) which is functionally analogous to the carnassial above, is also, as in the dog, the first of the true molar series, and the homotype of the little tubercular tooth (*m.* 1) above. And the homologies of the permanent teeth *p.* 4 above, and *m.* 1 below, with those so symbolised in the dog, (fig. 39,) teach us that the teeth which are wanting, in order to equal the number of those in the canine dentition, are *m.* 2 in the upper jaw, *m.* 2 and *m.* 3 in the lower jaw; *p.* 1 in the upper jaw, *p.* 1 and *p.* 2 in the lower jaw; thus illustrating the rule enuntiated above, that, when the molar series falls short of the typical number, it is from the two extremes of such series that the teeth are taken,

and that so much of the series as is retained, is thus preserved unbroken. In the great extinct sabre-toothed tiger (*machairodus*, fig. 37, vi,) the series is still further reduced by the loss of *p.* 2 in the upper jaw.

Fig. 39.

Deciduous and permanent teeth in the Dog (Canis.)

That the student may test for himself the demonstration which the developmental characters above defined, yield of the true nature and homologies of the feline dentition—the most modified of all in the terrestrial carnivora, he is recommended to compare with nature the following details of the appearance and formation of the teeth in the common cat. In this species, the deciduous incisors *d. i.* begin to appear between two and three weeks old; the canines *d. c.* next, and then the molars *d. m.* follow, the whole being in place before the sixth week. After the seventh month they begin to fall in the same order; but the lower sectorial molar *m.* 1, and its tubercular homotype above (*m.* 1) appear before *d.* 2, *d.* 3, and *d.* 4 fall. The long-

itudinal grooves are very faintly marked in the deciduous canines. The first deciduous molar (*d.* 2,) in the upper jaw, is

Fig. 40.

Deciduous and permanent teeth in the Lion (Felis.)

a very small and simple one-fanged tooth; it is succeeded by the corresponding tooth of the permanent series, which answers to the second premolar (*p.* 2) of the hyæna and dog. The second deciduous molar (*d.* 3) is the sectorial tooth; its blade is trilobate, but both the anterior and posterior smaller lobes are notched, and the internal tubercle, which is relatively larger than in the permanent sectorial, is continued from the base of the middle lobe, as in the deciduous sectorial of the dog and hyæna; it thus typifies the form of the upper sectorial, which is retained in the permanent dentition of several viverrine and musteline species. The third or internal fang of the deciduous

sectorial, is continued from the inner tubercle, and is opposite the interspace of the two outer fangs. The musteline type is further adhered to by the young feline in the large proportional size of its deciduous tubercular tooth *d.* 4. In the lower jaw, the first milk-molar (*d.* 3) is succeeded by a tooth (*p.* 3) which answers to the third lower premolar in the dog and civet. The deciduous sectorial (*d.* 4,) which is succeeded by the premolar (*p.* 4,) answering to the fourth in the dog, has a smaller proportional anterior lobe, and a larger posterior talon, which is usually notched; thereby approaching the form of the permanent lower sectorial tooth in the *mustelidæ.*

In the article carnivora, (vol. i, p. 488,) the remarks on the teeth are limited chiefly to their physiological adaptations. A description of some of their more remarkable structures will here be given, according to the idea of the nature of the teeth above developed. The dental formula of the dog, jackal, wolf, and fox, is illustrated in fig. 37, iii, canis.

In the *megalotis*, or long-eared fox, (*otocyon*, licht.,) the deviation from the typical dentition of the *canidæ* is effected by excess of development; two additional true molars being present on each side of the upper, and one on each side of the lower jaw, in the permanent series of teeth; and an approach is made by the modified form of the sectorial molar, and of some of the other teeth, to the dentition of *viverridæ.* This family of carnivora, which comprehends the civets, genets, ichneumons, musangs, surikates, and mangues, is characterized, with few exceptions, by the following formula:—*i.* $\frac{3-3}{3-3}$; *c.* $\frac{1-1}{1-1}$; *p.* $\frac{4-4}{4-4}$; *m.* $\frac{2-2}{2-2}$: = 40. It differs from that of the genus *canis* by the absence of a tubercular tooth (*m.* 3) on each side of the lower jaw; but, in thus making a nearer step to the typical carnivorous dentition, the *viverridæ*, on the other hand, recede from it by the less trenchant and more tubercular character of the sectorial teeth.

The canines are more feeble, and their crowns are almost smooth; the premolars, however, assume a formidable size and shape in some aquatic species, as those of the sub-genus *cynogale*, in which their crowns are large, compressed, triangular,

sharp-pointed, with trenchant and serrated edges, like the teeth of certain sharks, (whence the name *squalodon*, proposed for one of the species,) and well adapted to the exigencies of quadrupeds, subsisting principally on fish: the opposite or obtuse, thick form of the premolars is manifested by some of the musangs, as *paradoxurus auratus*. The upper sectorial tooth, *p.* 4, is characterized by having its inner tubercle larger, the middle conical division of the blade thicker, and the posterior one smaller than in the genus *canis*. This tooth advances to beneath the ant-orbital foramen in the musangs (*paradoxurus* :) it is situated farther back in the civets and genets, in which the blade of the sectorial is sharper. This shows that relative position to the zygomatic or molar process of the maxillary is not a good character.

In the lower jaw the sectorial tooth (*m.* 1) manifests its true molar character by the presence of an additional pointed lobe on the inner side of the two lobes forming the blade at the forepart of the crown: the posterior, low, and large lobe of the tooth being also tri-tuberculate, as in the dog. The last molar (*m.* 2) has an oval crown, with four small tubercles, resembling the penultimate lower molar in the dog, with which it corresponds.

The deciduous dentition consists, in the viverrine family, of: incisors $\frac{3-3}{3-3}$; canines $\frac{1-1}{1-1}$; molars $\frac{3-3}{3-3}$:=28. If the first permanent premolar has any predecessor, it must be rudimental, and disappear early in both jaws; the second premolar displaces the first normally developed deciduous molar; the third upper premolar displaces and succeeds the deciduous sectorial, which has a sharper and more compressed blade, and a relatively smaller internal tubercle, than the permanent sectorial. This tooth displaces the last deciduous molar, which is a tubercular tooth, resembling, in form, the first of the two upper permanent tuberculars; these coming into place without pushing out any predecessors, enter into the category of true molar teeth. In the lower jaw the third premolar displaces the deciduous sectorial, which has three trenchant lobes and a relatively smaller posterior talon than the permanent sectorial. The

fourth premolar displaces the third or tubercular milk-molar. The permanent sectorial and tubercular molars, displace no predecessors, and are therefore *m.* 1 and *m.* 2.

The first premolar, *p.* 1, is not developed at any period in the mangues (*crosarchus*,) the suricates (*ryzæna*,) or the *mangusta paludinosa;* these viverrines, therefore, retain throughout life, more of the immature characters of the family, and in the same degree approach, in the numerical characters of their dentition, to the more typical carnivora.

The alternate interlocking of the crowns of the teeth of the upper and lower jaws, which is their general relative position in the carnivora, is well marked in regard to the premolars of the *viverridæ*, fig 37, iv :) as the lower canine is in front of the upper, so the first lower premolar rises into the space between the upper canine and first upper premolar; the fourth lower premolar, in like manner, fills the space between the third upper premolar (*p.* 3) and the sectorial tooth (*p.* 4,) playing upon the anterior lobe of the blade of that tooth, which indicates by its position, as by its mode of succession, that it is the fourth premolar of the upper jaw. The first true molar below, modified as usual in the *carnivora* to form the lower sectorial, sends the three tubercles of its anterior part to fill the space between the sectorial (*p.* 4) and the first true molar (*m* 1) above. In the musangs, the lower sectorial is in more direct opposition to its true homotype, the first tubercular molar in the upper jaw; and these Indian *viverridæ* (*paradoxuri*) are the least carnivorous of their family, their chief food consisting of the fruit of palm-trees, whence they have been called "palm-cats."

Hyæna.—The dentition of this genus presents a nearer approach to the strictly carnivorous type, by the reduction of the tubercular to a single minute tooth on each side of the upper jaw, the inferior molars being all conical or sectorial teeth: the molar teeth in both jaws are larger and stronger, and the canines smaller in proportion than in the feline species, from the formula of which the dentition of the hyæna differs numerically only in the retention of an additional premolar tooth, *p.* 1 above and *p* 2 below, on each side of both jaws. The dental formula

of the genus *hyæna* is:—*in.* $\frac{3-3}{3-3}$, *c.* $\frac{1-1}{1-1}$, *pm.* $\frac{4-4}{3-3}$, *m.* $\frac{1-1}{1-1}$ = 34. The crowns of the incisors form almost a straight transverse line in both jaws, the exterior ones, above, being much larger than the four middle ones, and extending their long and thick inserted base further back: the crown of the upper and outer incisor (*i.* 3,) is strong, conical, recurved, like that of a small canine, with an anterior and posterior edge, and a slight ridge along the inner side of the base. The four intermediate small incisors have their crown divided by a transverse cleft into a strong anterior, conical lobe, and a posterior ridge, which is notched vertically; giving the crown the figure of a trefoil. The lower incisors gradually increase, in size, from the first to the third; this and the second have the crown indented externally; but they have not the posterior notched ridge like the small upper incisors; the apex of their conical crown fits into the interspace of the three lobes of the incisor above. The canines have a smooth convex exterior surface, divided by an anterior and posterior edge from a less convex inner side: this surface is almost flat, and of less relative extent in the inferior canines. The first premolar above (*p.* 1) is very small, with a low, thick, conical crown: the second presents a sudden increase of size, and an addition of a posterior and internal basal ridge to the strong cone. The third premolar exhibits the same form on a still larger scale, and is remarkable for its great strength. The posterior part of the cone of each of these premolars is traversed by a longitudinal ridge. The fourth premolar is the carnassial tooth, and has its long blade divided by two notches into three lobes, the first a small thick cone, the second a long and compressed cone, the third a horizontal sinuous trenchant plate: a strong triedral tubercle is developed from the inner side of the base of the anterior part of the crown. The single true molar of the upper jaw (*m.* 1) is a tubercular tooth of small size: transversely oblong in the *hyæna vulgaris* and *H. fusca;* smaller and sub-circular in the *hyæna crocuta;* still smaller and implanted by a single fang in the *hyæna spelæa:* in all the existing species of hyæna it has two fangs. The first premolar of the lower jaw (*p.* 2) fits into

the interspace between the first and second premolars above, and answers, therefore, to the second lower premolar in the *viverridæ:* it is, accordingly, much larger than the first (*p.* 1) above; it has a ridge in the forepart of its cone, and a broad basal talon behind. The second (*p.* 3) is the largest of the lower premolars, has an anterior and a posterior basal ridge, with a vertical ridge ascending upon the fore as well as the back part of the strong rounded cone: the third premolar (*p.* 4,) is proportionably less in the *hyæna crocuta* than in the *H. vulgaris:* its posterior ridge is developed into a small cone; the last tooth (*m.* 1) is the sectorial, and consists almost entirely of a blade divided by a vertical fissure into two sub-equal compressed pointed lobes: the points are less produced than in the felines, but the lower sectorial of the hyæna is better distinguished by the small posterior basal talon, from which a ridge is continued along the inner side of the base, and is slightly thickened at the forepart of the crown. According to the relative position of the crowns of the premolars, the third below ought to be the last, being analogous to the fourth in the *viverridæ*, and the sectorial should be first true molar: we shall find this view confirmed by the test of the mode of succession of the permanent teeth. But the mode of implantation of the premolar and molar teeth may first be noticed. The first upper premolar has but one fang; the second and third have each two; the sectorial tooth has three, the two anterior ones on the same transverse line, the inner one supporting the tubercle. The lower premolars and sectorial have each two fangs, there being none truly answering to the first above: the anterior root of the lower (*p.* 1) sectorial tooth is very strongly developed in the great extinct cave-hyæna.

The deciduous teeth consist of:—*i.* $\frac{3-3}{3-3}$, *c.* $\frac{1-1}{1-1}$, *m.* $\frac{3-3}{3-3}$,= 28. The figure of the skull of the young *hyæna crocuta* in the posthumous edition of the "Ossemens Fossiles," 8vo. 1836, pl. 190, fig. 3, shows that stage when the correspondence with the formula of the genus *felis* is completed by the appearance, in the upper jaw, of a small premolar in the interspace between the canine and first molar of the deciduous series: but this ap-

pearance is due to the apex of the first permanent premolar which cuts the gum before any of the normal deciduous teeth are shed : whether it is preceded, as in the dog, by a deciduous germ-tooth in the fetus, I know not. The first normal deciduous molar is two-fanged, and has a more compressed, and consequently more carnivorous crown than that of the second permanent premolar by which it is succeeded. The second deciduous molar is the sectorial tooth: the inner tubercle is continued from the base of the middle lobe, and thus resembles the permanent sectorial of the glutton (*gulo*) and many other *mustelidæ ;* the deciduous tubercular molar is relatively larger than in the adult *hyæna*, and offers another feature of resemblance to the permanent dentition of the glutton. It is also worthy of remark, that the exterior incisor of the upper jaw is not only absolutely, but relatively smaller in the immature than in the adult dentition of the hyæna, and again illustrates the resemblance to the more common type of dentition in the carnivora.

The first and second deciduous molars below, have more compressed conical crowns than their successors; the third deciduous molar is the sectorial tooth, and again, as in *gulo*, has a better developed hinder tubercle than the permanent sectorial; it is not displaced by this tooth, but, as in other carnivora, by a premolar of more simple character. The permanent sectorial is developed posteriorly, and rises, like other true molars, without displacing a deciduous predecessor.

The permanent dentition of the *hyæna*, as of other genera or families of the carnivora, assumes those characteristics which adapt it for the peculiar food and habits of the adult, and mark the deviation from the common type, which always accompanies the progress to maturity. The most characteristic modification of this dentition, is the great size and strength of the molars as compared with the canines; and more especially, the thick and strong conical crowns of the second and third premolars in both jaws, the base of the cone being belted by a strong ridge which defends the subjacent gum.* This form of

* An eminent civil engineer, to whom I showed the jaw of a hyæna, observed that the strong conical tooth with its basal ridge, was a perfect model of a hammer for breaking stones for roads.

tooth is especially adapted for gnawing and breaking bones, and the whole cranium has its shape modified by the enormous development of the muscles which work the jaws and teeth in this operation.* Adapted to obtain its food from the coarser parts of animals which are left by the nobler beasts of prey, the hyæna chiefly seeks the dead carcass, and bears the same relation to the lion which the vulture does to the eagle. In consequence of the quantity of bones which enter into its food, the excrements consist of solid balls of a yellowish white color, and of a compact earthy fracture. Such specimens of the substance, known in the old *materia medica*, by the name of "album græcum," were discovered by Dr. Buckland, in the celebrated ossiferous cavern at Kirkdale. They were recognised at first sight, by the keeper of a menagerie, to whom they were shown, as resembling, both in form and appearance, the fœces of the spotted hyæna; and, being analysed by Dr. Wollaston, were found to be composed of the ingredients that might be expected in fœcal matter derived from bones, viz. phosphate of lime, carbonate of lime, and a very small proportion of the triple phosphate of ammonia and magnesia. This discovery of the coprolites of the hyæna formed, perhaps, the strongest of the links in that chain of evidence, by which Dr. Buckland proved, that the cave at Kirkdale, in Yorkshire, had been, during a long succession of years, inhabited as a den by hyænas, and that they dragged into its recesses the other animal bodies, whose remains splintered, and bearing marks of the teeth of the hyæna, were found mixed indiscriminately with their own.—*By Professor Owen, from the Cyclopædia of Anatomy and Physiology.*

* "The strength of the hyæna's jaws is such, that, in attacking a dog, he begins by biting off his leg at a single snap." Buckland, "Reliquiæ Diluvianæ," p. 23.

ARTICLE XIII.

Acute Periostitis. By J. H. M'Quillen, M. D., Dentist. Read before the Pennsylvania Association of Dental Surgeons, and published at their request.

Acute periostitis, or inflammation of the membranes investing the alveola and roots of the teeth, is an affection of frequent occurrence; and its local effects are sometimes attended with serious consequences. The various diseases of the antrum, in the majority of cases, can be traced to this as the exciting cause; also, spina ventosa, osteo sarcoma (usually considered a malignant disease,) necrosis, and exfoliation, in either maxilla, may nearly always claim it as a common parent. Following these, permanent deformity of the "face divine" has resulted as a sequence.

Causes.—Destruction of the dental pulp may act as an exciting cause, whether resulting from simple exposure to variations of temperature; acrid secretions of the mouth; compression of the pulp, from lodgment of foreign bodies in the cavity of decay, as portions of food, or the insertion of a plug; and, lastly, the exhibition of a corrosive agent, at the hands of a dentist. This, however, is a rare excitant, when the treatment is properly conducted. The destruction of the pulp, not followed by its removal, and plugging the dental canal, but merely filling the cavity of decay, is, in the majority of cases, soon followed by the appearance of this affection. The state of utero-gestation appears to be a condition of the system particularly prone to the development of this affection (when there is a predisposition that way, owing to the pressure of diseased roots and teeth.) This is easily accounted for, by the cerebral determination so characteristic of this state. The attention of the writer was directed to this circumstance several years ago, by Professor J. D. White; his own experience since that time, has confirmed the correctness of the observation. It appears, however, to have escaped the attention of dental writers, as

none have mentioned it in their productions. And yet, the knowledge of this, is a matter of moment, as by well-timed and judicious operation, much suffering could be spared those who suffer most.

Like inflammation in other parts of the body, this is divisible into three stages, viz. simple vascular excitement, active congestion, and true inflammation.

The first stage, which is simply a hyperemic condition of the capillary vessels of the membrane, the circulation through the part proceeding, at the same time, with unwonted velocity, merely occasions a slight amount of tenderness, which is increased by striking sharply on the affected tooth with the handle of an instrument. A sense of relief is obtained, by gradual and continued pressure upon the tooth; which, however, on being removed, is followed by a recurrence of the tenderness. At this point, without any attention from the practitioner, the vessels, by unloading themselves, and decreasing to their natural calibre, the part will return to its normal condition. Should the action not cease here, but proceed, *active congestion* is established: the capillaries become more and more distended, until distension is no longer possible, owing to the confined locality of the tissue; exudation of the liquor sanguinis take place to a slight extent; the most excruciating pain is now experienced, and along with it, intolerance of the slightest pressure. On this account, closure of the teeth is avoided, as it but aggravates the evil. The tooth seems longer and looser than its neighbors—and such is really the case; for, owing to the distension of the blood-vessels of the membrane, the root is forced slightly out of its socket. The pain is sometimes intermittent in its character, but in the majority of cases is continued; an increase of it is, however, experienced by nearly all towards evening. This is attributable to the febril exacerbations. By proper and active treatment, the action may possibly be arrested even here. This, not succeeding, or being attempted too late, it advances to *true inflammation*. Effusion of plasma takes place to a greater extent than in the previous stage; stagnation of the circulation through the part occurs;

in the surrounding tissue on the contrary, it is going on with increased activity. The pain is lancinating in its character, owing to the efforts of the blood on the cardiac side to overcome the obstructing mass; the gums are very much swollen, excessively tender, and unnaturally red; the side of the face on which the affected tooth is situated, becomes edematous, and increases to an unnatural size. After this has continued for a shorter or longer period *suppuration* takes place, by *disintegration of the effused plasma.* The abscess is generally situated at the apex of the root. It usually makes its escape from the socket by the opening effected through the thin parieties of the alveolus, on the buccal side, though sometimes the lingual. A place of exit being thus procured, the abscess advances through the gum, and arriving at the surface, evacuates its contents into the mouth. Under favorable circumstances, this is followed by a cessation of pain, and a restoration of the part involved to a healthy condition. Such a favorable termination is not always to be anticipated. The abscess may open into the antrum, or even when it has made its way to the gum, it may not approach the surface, but burrow, and thus the consequences alluded to, may result, if an opening is not made quickly and boldly by the lancet.

Treatment.—Should the tooth be a valuable one, with the prospect of future usefulness, every effort should be made to save it. The practitioner should always bear in mind, and impress upon his patient, the fact, that even after the part has been restored to a healthy condition, that it is liable, at any moment, to take an inflammatory action. As it is an axiom in surgery, that a part which once has been truly inflamed, leaves that part much more susceptible to the action of exciting causes, and hence is more liable than healthy tissue to become the seat of subsequent disease. Having decided to save the tooth, the treatment in the first and second stages is somewhat analogous, the only difference consisting in its being more active in the latter than in the former. Slight scarification of the gum, cold or warm water, (as is most comfortable to the patient,) held in the mouth, may suffice for the first; but the application of two

or three leeches to the gum will be imperatively demanded, to prevent the establishment of the inflammatory acmé in the second. Now, the idea of having a leech placed in the mouth, is repugnant to the feelings of all, and particularly the over-sensitive. It therefore affords the writer much pleasure to invite your attention to a recent invention of a French gentleman, which is called an artificial leech. It consists of a glass tube or cylinder, with a piston fitting accurately, and attached, by means of India rubber, to a piece of horn, situated at the upper orifice of the tube ; the horn is perforated through its centre, to admit a small steel rod, by which the piston is forced down to the lower orifice. Applying it now to a gum recently scarified, and removing the rod, the India rubber contracts and draws the piston to its former position ; a vacum is thus formed, into which the blood flows freely, owing to the removal of the atmospheric pressure, and consequent distension of the blood-vessels. As much blood can thus be removed as the practitioner may deem necessary. Having used it, and found it to answer the purposes indicated, I can vouch for its utility.

As a case in point, Miss T——, a lady of an excessively nervous temperament, called upon me to have a lateral incisor of the right superior maxillary plugged. In removing the decay, the pulp was found to be exposed. Forthwith, the arsenical paste was applied, to destroy its sensibility. At the expiration of eighteen hours, the pulp was removed ; there was a slight hemorrhage from the upper part of the dental canal, but no painful sensation was experienced by the patient, either from the introduction of a fine and flexible probe, passed up the canal as far as practicable, or upon striking the tooth sharply with the handle of an instrument. Introducing a pledget of cotton into the pulp cavity, and packing it firmly, so as to arrest the slight amount of hemorrhage—thus preventing the imbibition of the coloring matter of the blood into the tubuli, and consequent discoloration—the patient was directed to call the next day. On the following day, the bleeding had ceased ; the dental canal and cavity of decay were then plugged with gold foil. Owing to the temperament of the patient, and the

fact of her being under treatment for a neuralgic affection of the eyes, I still, notwithstanding the absence of the slightest sensibility, apprehended the establishment of some irritation, and therefore requested to be informed, if pain supervened, as soon as possible. At the expiration of four or five days, the patient called and told me that the night before, she had been attacked with a slight pain, which had augmented in severity until it had become almost insupportable. The artificial leech was applied, and from one to one and a half ounces of blood removed. The application of cold water to the part, to be continued for some time, was then advised. This plan was followed by the happiest effects.

When, however, the third stage is established—indicated by the puffy condition of the gums and face—*resolution* is no longer practicable; depletion, therefore, is not admissible, as it retards the suppurative stage—the indication being to promote this as speedily as possible, and relieve the sufferer of the intolerable pain. Emollient poultices applied to the gum, as roasted figs, or flaxseed enveloped in a gause sack, will be found very serviceable in this stage. The domestic practice of enveloping the entire side of the face in a huge poultice, cannot be too highly deprecated, as it has a tendency to induce the abscess to point at the surface of the cheek, and possibly open through it. Many persons carry a scar there, as an evidence of this injudicious custom. Two or three days days will generally suffice for the formation of pus; therefore, a practitioner who will allow his patient to go an entire week, without attempting to effect its evacuation by the lancet, is culpable in the extreme.

On Friday, October 17th, an Irish laborer presented himself at the office, with the right side of his face very much swollen, and complaining of considerable pain. Upon requesting him to open his mouth, I found that he could only separate the jaws sufficiently to introduce the little finger between the teeth. Requesting a history of the case, the following was given: A week previous, an unsuccessful attempt was made to extract the dentes sapientiæ of the inferior maxillary, right side. During

that night, the pain became lancinating in its character, and on the following morning, the face presented the edematous appearance described above. Thus a whole week had been passed, of intolerable suffering—the person, at the same time, being incapacitated for the performance of his daily avocation. It was plainly perceptible that the abscess was pointing towards the surface of the cheek. As no time was to be lost, a free incision was made internally with the lancet, which was followed by a profuse discharge of pus. A small piece of cotton was then placed in the wound, to keep its lips patulous, and also to act as a tent, to drain off the pus that otherwise might accumulate in the abscess, and necessitate the use of the lancet again. The patient was requested to call in a few days, to have the roots removed. At the time specified, they were extracted without any difficulty. The pain had disappeared, and the face had resumed its natural expression. In conclusion, the writer would cite a case of malpractice, that came under his notice about five years ago, whilst in the office of his preceptor. The patient, in this case, was by occupation a cab-driver, and therefore exposed to all the inclemencies of weather and variations of temperature. The history of the case was as follows: A second molar of the inferior maxillary, left side, was attacked with periostitis, and resulted in the formation of an abscess. Owing to the application of one of the huge poultices alluded to, it pointed externally. At this crisis, he called upon a druggist, who lanced it *externally*, and in the course of a few days, applied a plaster, to promote the healing, and closure of the wound. This, however, proved futile, and on the contrary, a fistula was formed, through which the pus exuded. This continued four or five weeks, when the patient was advised to call upon my preceptor. Looking upon the tooth as the cause of all the mischief, he at once removed it; this was followed by a disappearance of the fistula, but a deep pit was left as an evidence of the impropriety of lancing externally.

Perfectly conscious of numerous imperfections, and want of style and arrangement, and the possible adoption of erroneous views, these remarks are submitted to you. If the latter is the

case, now is the time for correction; and the writer will be but too happy to acknowledge himself in error, if those errors are pointed out, and correct views substituted in their place. He therefore hopes that this may draw forth the views of the members present.—*Dental News Letter.*

ARTICLE XIV.

Remarks on Atmospheric Plates. By T. L. Buckingham, M. D., Dentist.

Recently, there has been much discussion respecting the use of the cavity or chamber in plates. Various opinions have been expressed, some approving, others disapproving, of its use. Some consider it the best method of inserting full upper sets of artificial teeth, and have adopted it not only in these cases, but in some partial sets also, while others are as strongly opposed to it. They think that, instead of its being an advantage, it is a disadvantage; that, although it will assist to hold up a plate at first, the cavity soon becomes filled by the congested vessels, and then, instead of assisting to keep the plate in its place, it only tends to displace it.

We propose, in this article, to attempt to explain the manner in which it acts, and answer some of the objections made to its use. We own we are its advocate: we have used it in numerous instances, and do not know how we could get along without it, unless something can be discovered that will answer better. We are certainly not disposed, at present, to go back to the old mode of making plates, no wider than will cover the alveolar ridge, and compel the wearers to keep their teeth closed while they talk, and hold them up with their tongue when they want to take anything into the mouth.

We will first state that the same depth of cavity will not suit for all cases. For a soft, spongy mouth, the cavity should be deeper than for one that is hard and unyielding. In the first, the mucous membrane will bear stretching to a considerable

extent, without producing irritation ; in the other, if the cavity is deep, there will be a constant vacuum, which will produce so much strain upon it, as to cause a very unpleasant, if not ultimately an injurious, effect. It is not at all uncommon to find mouths in which the mucous membrane has been disrupted, by the constant pressure made upon it, and an abnormal growth of tissue filling the cavity entirely up, which prevents it from being of any further use.

We never make a cavity deeper than the mucous membrane will stretch and fill up, without irritation, depending upon the elasticity of the vessels to hold it in its place ; for, it takes as much pressure to keep the vessels congested, as it did to congest them at first, unless they have become permanently enlarged, which seldom is the case, if there has not been too much strain upon them.

The question is asked in the January number of the "American Journal of Dental Science," how we "explain, upon scientific principles, how a partial vacuum can be obtained?" That a partial vacuum can be produced in the mouth, we suppose nobody will doubt. Every time we inspire, or every time we drink, (unless it is when the head is thrown back, and the fluid poured into the mouth,) proves that there is a vacuum, and the air or fluid rushes in to fill it. But this is not vacuum enough to be of any benefit to us ; we can produce a greater vacuum by what we term "suction."

If we take a tube, closed at one end, and put the open end in the mouth, close the lips and nostrils, then, by the action of the thoracic muscles, produce a partial vacuum in the chest, a portion of the air in the mouth rushes into the lungs, to establish an equilibrium. This is what is termed suction. Now, if the tongue be pressed on the open end of the tube, so as to close it, and the air admitted into the mouth, the tube will stick to the tongue, and it will require a considerable effort to pull it off. This, every child of five years of age has done a hundred times with its mother's keys or thimble ; and this is vacuum enough for our purpose. It is not equal to fifteen pounds to the square inch, we admit ; nor, perhaps, one-fifth of it. Fifteen pounds to the square inch would

tear the mucous membrane from the palatine bones; it would cause the blood to ooze out through the pores of the skin. The thickest part of a bullock's hide would hardly bear it, over any extent of surface; and yet we talk about applying that amount of pressure to the delicate membrane in a lady's mouth! Fifteen pounds is nearly a perfect vacuum at the level of the sea. This is more than we can obtain with an air-pump; for, there must always be air enough left in the receiver to work the valves, even if we allow nothing for leakage.

That we can produce a partial vacuum in the mouth being proved, the question is asked, "how does the air get out of the chamber without having a valve in it?" It would have been much more difficult to answer, had it been asked how it could be "kept in." If we take an India rubber bag, and tie the mouth so as to prevent the escape of the air it contains, then place it under the receiver of an air-pump, and exhaust the air from the receiver, the bag will swell up to several time its ordinary size. If, in the place of an India rubber bag, we take a glass bottle, and cork it up tight, and place it under the receiver, the bottle, unless it is very strong, will be broken to pieces: for, the pressure of the air on the inside, is equal to the pressure taken off the out side. But how does the air get out from under the plate? We make a partial vacuum in the mouth; in doing which, the teeth are held some distance apart; the cheeks are pressed down upon the artificial teeth, which loosens them from the gum; then the air rushes out from under the plate, to establish an equilibrium with the air that is in the mouth and lungs. Just before the air is admitted into the mouth, the plate is pressed firmly against the roof, with the tongue, and held there. If the plate fits perfectly around the edges, the air is prevented from getting into the chamber; and by the pressure of the atmosphere on the outside, it is made to adhere firmly to its place.

Now that we have explained, or at least attempted to do so, how we get a vacuum in the chamber, we will say a few words on the chambers generally in use.

There are but three or four kinds of chambers which we

think necessary to examine at present; all the others have either been abandoned, or are used so seldom, that we will not mention them here. The first we propose to notice, is made by enlarging the rugæ of the mouth, or sometimes by making a number of small chambers in the plate, about the size of half a pea, without regard to locality. With this kind of chamber, we have not succeeded very well, although others continue to use them, and in some cases, prefer them to all others. In our cases, we have found that, unless the edges of the plate fit perfectly, the air would creep in at some place, and destroy the adhesion. It is almost impossible to make those portions of the plate, between the chambers, fit so perfectly as to isolate each chamber. If this is not done, and we have to depend upon the edges of the plate to exclude the air, we can see no advantage possessed by this kind over one large chamber.

The next is Dr. Flagg's. This, we have also used, but without much success, finding the difficulty attending it which might have been expected from its position. The cavities are formed on the top of the alveolar ridge—the place, above all others, on which the plate should press in masticating. If we make a chamber here on each side, "about one inch in length, by three-eighths in width, and one-tenth in depth," as the doctor proposes, the plate forms a wedged-shaped cup, down the sides of which the gums are forced every time pressure is made upon it. The whole pressure comes upon the alveolar and maxillary bones on the outside, and the maxillary and palatine bones on the inside, and not upon the alveolar ridge; and we all know that an inclined plane will produce a greater pressure than the same amount of force applied in a direct line on a plain surface.

Dr. Cleavland's is the next to be noticed. This is made by striking up a plate to fit a cast of the mouth; an opening is then cut in the centre, varying from the size of a dime to that of a quarter of a dollar. Over this plate, and about an eighth of an inch from it, another plate is fitted, which meets the first as it rises on the alveolar ridge. Here the plates are soldered together; this makes a very smooth and pleasant surface for the tongue. These chambers are much larger on the inside

than they are at the opening; this allows the gum, when it is forced up into the chamber, to curl over the edge of the plate. There is no doubt about this chamber holding a plate firm; but the edge of the plate irritates the gum so much as to keep it constantly sore. In addition to this, the shape of the chamber precludes the possibility of keeping it clean, and it becomes very offensive. To remedy this objection, a band is sometimes inserted around the external opening, and soldered to the plates. This makes a chamber exactly like Gilbert's with an acute edge; this sharp edge always keeps the gum sore. We have seen several cases where this chamber has been worn for some length of time, and they all presented the same appearance, namely: a ring of inflammation upon the gum, which, in some cases, extended over the whole roof of the mouth.

In inserting artificial teeth, we should produce as little irritation as possible. It is bad enough to be compelled to wear them, without having the mouth constantly sore. This chamber will hold a plate firmer than any other we know of. If the plate fits close around the edge of the chamber, it matters very little, whether it fits in other places or not. It is like a dry cup on some soft part: pull it in any direction you please, it still adheres.

The last chamber we will notice, is Gilbert's. This kind has been used in more cases than any other we know of, and has generally given more satisfaction. In his application for a patent, Gilbert specifies no size or shape, but claims as follows: "The plate being made single, and a chamber being sunk in the central part of the upper surface of the plate, in which a vacuum can be formed by the tongue." Whether Mr. Gilbert was the first to use this kind of a chamber, we do not know; but this we do know: that as soon as he made known to the profession that he had taken out a patent, many others, in all parts of the country, claimed to have used the same thing years before. This may appear strange to those out of the profession; but, when they consider that every invention that has been made in dentistry, has had at least a dozen claimants; they must conclude that every dentist is a genius, and the only

reason his inventions have not been brought before the profession, is because he has not quite completed them ! for, make what you will, and show it to all you meet, you will find they have all used, or thought of it, years before.

As we have stated before, this chamber should not always be made of the same depth. We sometimes make it with abrupt edges, by driving the edge down with a punch, (but never make it sharp enough to cut;) in other cases, the chamber gradually diminishes in depth from the centre to the edge. The only rules we have to govern us, is: first, not to make the edges of the chamber sharp enough to irritate the gum ; and next, to make the cavity no deeper than the mucous membrane will fill up without producing inflammation.

When we insert artificial teeth, we should not try how great a weight we can make them sustain without falling; but to give the most satisfaction and comfort to our patients. To do this, it is not necessary that it should take fifteen or twenty pounds to displace them. All that is required, is, that they shall adhere tight enough to prevent them from falling when the mouth is opened. If they do this, and the teeth are articulated properly with the under teeth, there is very little danger of their coming down in mastication, after the patient has worn them a short time.—*Dental News Letter.*

ARTICLE XV.

Illustrations of the successful treatment of Cleft Palate by the Division of the Levator-Palati, Palato Pharyngeus, and sometimes the Palato-Glossus Muscles. By John Avery, Esq., F. R. S., Surgeon to Charing-Cross Hospital.

The operation recommended by Professor Ferguson: its advantages. Dr. Warren's proposal for its performance. Extensive incisions advised by continental surgeons. Cases detailed, in which the operation has proved successful Suggestion for modification of the cutting-instrument employed. Bloodlessness and little pain, or constitutional disturbance attendant on the operation. M. Sédillot on staphyloraphy. A desideratum attained in adoption of the process pointed out for the cure of cleft palate.

The principal reason for publishing the three following cases of cleft palate, is to show the complete and speedy success which resulted in all of them, after the division of the above named muscles, as recommended by Professor Fergusson, of King's College; and although their number is small, their results yield good testimony in favor of this particular method, the merits of which will be more impartially appreciated in the successful cases of those who are not the inventors of the method than in the cases of the inventor himself. They may also serve to call the attention of the profession again to this able, ingenious, and scientific operation, of the feasibility and utility of which many skillful surgeons still remain very sceptical.

A careful review of all the different modes of uniting the cleft palate, shows that the plan alluded to is the only one founded on a truly scientific basis—on strictly anatomical and physiological grounds—the only one, indeed, offering fixed and precise rules, by which the operator, who has made himself well acquainted with the anatomy of the parts, can, with certainty, and without any extraordinary skill, accomplish the division of all the muscles which tend to pull the disunited parts asunder. This is done in the manner proposed, with the great-

est effect, and the least possible mutilation, and in such a position as to produce the least amount of irritation during the after treatment, and also to give the greatest aid, in all other respects, towards keeping the parts in perfect quietude. In consequence of the almost complete temporary paralysis of the muscles thus produced, full advantage can be taken of giving liquid food from the earliest moment, a proceeding so much insisted on by Sir Philip Crampton, and scarcely second in importance to anything connected with the operation. The only operator who might appear in any way to have anticipated the merits of this proposal, is Dr. I. M. Warren, who made some incisions which had partially the effect of those made by Mr. Fergusson; but any one can convince himself that the true principles of the operation were not understood by Warren, until he had become acquainted with Mr. Fergusson's paper, when he discovered how near he had accidentally been to the truth, without having been acquainted with, or at least having explained, the real reason for his incisions. Before he had seen the paper alluded to, he says,—"*If* the fissure is wide, and this (drawing the flaps together) cannot be effected, I have found the following course to be invariably followed by success. The soft parts being forcibly stretched, a pair of long, powerful, French scissors, curved on the flat side, are carried behind the anterior pillar of the palate: its (the palate's) attachments to the tonsil and to the posterior pillar are now to be carefully cut away, on which the anterior soft parts will at once be found to expand, and an ample flap be provided for all desirable purposes."

The conjunction in italics, shows clearly that Warren disregarded the action of the muscles entirely, if the parts could be brought together, which is relinquishing the very essence of the new method. And when he judges the incision necessary, the mere separation of the attachments of the palate to the tonsil and posterior pillar, is only a very small part of the divisions lately proposed. It is only after he becomes acquainted with this proposal that he directs (in the *American Journal of Medical Science*, vol. xli, 1848, p. 330,) "to cut away the posterior pillar of the palate with strong curved scissors, and *continue*

the dissection behind the soft palate until the latter yields, and allows itself to be drawn across the chasm," and here, again, only when the "halves are too small to be easily brought into contact." But the true principle—and this ought never to be lost sight of—is, not only to allow the halves to be brought easily into contact, but to prevent, as much as possible, all muscular action which could draw the parts asunder after the operation; and the less completely this principle is followed out, the more, I firmly believe, will be required to be done afterwards to remedy partial failures, which would not happen if the directions were rigidly adhered to. This is pretty well exemplified in a case which lately formed the subject of a clinical lecture, by Mr. Quain, published November 10, 1849. That gentleman seems still inclined to lay more stress, in his operation, on destroying the "natural elasticity" of the palate, and not clearly to admit the necessity of paralyzing the muscles, wherever they might act afterwards in drawing the parts asunder; for, he says, he is "not satisfied of the necessity of cutting the palato-pharyngeus and palato-glossus." The success of this case does not appear to warrant the counsel he has given his pupils, to leave out one of the principal parts of the method which has already proved so successful. The fissure was described as being simply in the soft palate, and in all respects favorable for the operation, yet, when the ligatures were taken out, two largish apertures remained open, and were only gradually diminished by the frequent application of nitrate of silver, and ultimately required the application of the actual cautery to close them. Indeed, an inference might fairly be drawn, that the success of the operation had been jeopardized, in consequence of the necessary division of the muscles not having been made. Nor can I agree with Mr. Quain in his advice to allow the parts to remain two hours after the operation before finally closing the sutures, "as the oozing may cause sickness," for I cannot imagine anything more calculated to produce sickness than the renewal of the bedevilment and discomfort of this very disagreeable operation, instead of at once concluding all the steps, giving the patient some comforting food, and placing him in bed.

Extensive incisions have been advised at various times, by Dieffenbach, Mettauer, Pancoast, and others, and no doubt, success will follow in many of these cases. My friend, M. Sédillot, the distinguished professor of military surgery, at Strasbourg, has lately succeeded admirably in uniting the simple fissure of the soft palate, in two cases, where he separated the posterior pillar of the palate, in the manner advised by Warren, and at the same time made an extensive lateral incision through the whole of the thickness of the velum, as practiced by Pancoast. He has also invented some very ingenious instruments for passing the sutures. But the aim of the surgeon should be to attain his object with as little mutilation as possible, and to simplify, instead of complicating the apparatus; and I can bear testimony to the perfect ease with which all the instruments advised by Mr. Fergusson, can be used; and how perfectly they answer the purpose they are intended for. I regret, that the able surgeon of Strasbourg, who was fully aware of the new method, had not given it a fair trial, as I feel assured, he would then have furnished us with additional evidence in favor of the more simple and scientific proceeding.

Case 1.—Mr. H——, aged twenty-two, a stout and florid looking young farmer, apparently in good health when he presented himself with cleft palate. The cleft commenced almost immediately behind the hard palate, and divided the velum and uvula into two equal halves. When irritated, the uvula and velum were so forcibly drawn upwards and outwards, that they became scarcely perceptible. When he attempted to swallow, the two sides nearly touched in the mesial line. He bore handling the parts well. His gums were spongy; his teeth were covered with tartar; his throat was red, relaxed, and covered with thick mucus. The wind being easterly at the time, and the weather very cold, he was directed to get his teeth attended to by a dentist, to take a quinine mixture, to use an alum gargle, and return to town when the weather was milder. He returned in May, and on the 20th, the operation was performed, in accordance with the directions given in Mr.

Fergusson's paper. First, the prominent ridge formed by the levator-palati, which is well seen in relief, coming from behind the opening of the eustachian tube, and widening as it descends, was divided with the knife curved on the flat, just where it passed into the velum, and from above downwards, so freely, that the edge of the knife could be seen moving above the mucous membrane of the under surface of the soft palate. This division was made first, without drawing the soft palate inwards, and completed afterwards, by extending it gently towards the mesial line, whilst the incisions were made. The posterior pillars of the fauces were then drawn out with forceps, and divided with a bistoury; they were afterwards pinched up, and further divided by a pair of curved, blunt-pointed scissors. The flaps now hung quite flaccid, and could be brought without difficulty to meet each other. It could not be said, they had no movement at all left in them, but they were nearly disabled, and more particularly at the posterior part of the velum and uvula. No difficulty at all occurred after this, in transfixing the velum at about a line from its free edge, and commencing quite at the anterior angle of the cleft, with a small pointed scalpel, and paring the edges to the very end of the uvula, without once taking the scalpel out, the parts being so perfectly under command from the previous incisions. Five sutures were then passed, by means of the simple handled nævus needle, slightly curved on the flat, proceeding from before backwards, and they were tied by the admirable knot described in the paper alluded to, and immeasurably superior, I believe, to all the devices hitherto invented for the purpose. In this case, it was not necessary to divide the anterior pillars of the fauces. The parts hung without the slightest appearance of tension. The patient bore the operation with great fortitude, and did not complain of much exhaustion: and it seemed to me, in this as well as in the succeeding cases, that the latter steps of the operation were much more supportable after the incisions had been made. He had a little weak barley-water to wash his mouth with, and he swallowed it without irritation. At eight o'clock P. M., he felt very comfortable, took a small cupful of

beef-tea, and had an injection of beef-tea, a wine-glass of sherry, and a drachm and a half of laudanum. Barley-water was placed by him to drink occasionally during the night. The remaining treatment and progress of the case are very simply detailed. He took generally, a little beef-tea, and a cupful of gruel with sherry in it twice a day, and also had an enema with a wine-glass of sherry in it, morning and evening, for the first six days, when he had mock-turtle soup, and went into the park. On the ninth day he had chicken and wine and water. On the twelfth, meat and porter, and went to see the Thames tunnel; and on the thirteenth he went home, with the part free from all danger of separation. His system was scarcely effected during the cure; his pulse, which was remarkably low for his time of life, never having been higher than 57 to 60, and sometimes as low as 48. He was a little sick on the third night, without the slightest effect on the ligatures. Forty-eight hours after the operation, the first and third ligatures were removed; on the third day, the fifth; on the fourth day, the second; and on the sixth, the fourth, which still held firmly when it was removed. After the third day, all fear of separation had nearly subsided. There were small ulcerations where the ligatures had been, and spots along the line of union were not completely healed on the under surface, but they all gradually closed by the thirteenth day, excepting one small place, about which there was no anxiety. The improvement in his speech was very marked as regarded making himself understood, the nasal twang remaining. There had been words which he had previously found it almost impossible to utter intelligibly, and which he could now easily make any one understand. His swallowing was also greatly improved.

Case 2.—This case was a patient of my friend Mr. Yearsly, of Savile-row. Mr. Fergusson had, with his accustomed liberality, demonstrated to him the preparation which had been the basis of his discovery. Mr. Yearsly had also witnessed my first operation; I assisted him in his, and had the opportunity of watching the progress of the case, and therefore, can vouch for complete justice having been done to all the steps of the

new method. It is unnecessary to enter minutely into the history of this case; for the age, the size, the condition of the patient, the character of the deformity, as well as the exact steps of the operation, the treatment, progress, and termination of the case, were as nearly as possible the same as in that already related, and the union was quite as perfect and immediate, and the result altogether as satisfactory.

Case 3.—This case was one of a much more aggravated character; so much so, indeed, that I did not anticipate a complete cure, and undertook the attempt, with the promise of closing the cleft in the soft palate only, and to leave the cleft in the hard palate to Mr. Thomas Bell, who had engaged to close that part effectually by means of an obturator. The result, however, was one of perfect success, with one operation only, and shows, in a proportionately clear light, the great value of the plan adopted. Henry B——, aged seventeen, healthy, but strumous and boy-looking for his age; had just returned from the country, where he had been for a couple of months for the purpose of getting himself into condition. He had hare-lip and cleft palate on his left side at his birth, and I learn from his mother, that the cleft extended originally from the lip, through the alveolar process, to the end of the uvula. This is probable, as there is still a deformity in the regularity of the teeth, one of the incisors being absent entirely, and two others very much squeezed together. The hare lip was united when he was very young. At the time of the operation, the cleft commenced in the hard palate, just behind the alveolar process, and continued directly backwards, dividing the soft palate and uvula into two halves. The division was more to the left than the right, particularly in the hard palate, as the vomer was attached to the hard palate of the right side, and the principal deficiency of bone was on the left side, there being very little breadth of bone in this situation. On the inner edge of the bony palate on this, the left side, there was a firm, roundish, ligament-like band, which was continued into the edge of the fissure in the soft palate. Both sides of the bony palate inclined very much upwards, so as to form an acute angle on each side with the alveolar processes—a form which I believe

is not usual in these cases, and which rendered the separation of the mucous membrane from the hard palate a matter of unusual difficulty. Both sides of the soft palate and uvula were pretty thick. The right did not extend so far backwards as the left, so that the two halves of the uvula hung very unevenly in the back of the throat. They almost disappeared at the sides of the fauces, when they were irritated, and approached each other very nearly on every attempt to swallow. The cleft in the hard palate was an inch in length, and the division, at its posterior part, was about three-quarters of an inch wide. The first step of the operation was to divide freely the levator-palati on each side, as in the first case; then the palato-pharyngeus. The flaps on both sides now lay much relaxed, particularly at their posterior part; but, as in the former instance, a slight movement still existed. After this, with the same curved knife used for dividing the levator-palati muscle, the fleshy part of the roof of the mouth covering the bony palate, was completely separated from the bones, in the way recommended by Warren; and then, with a pair of strong, sharp-pointed scissors, curved on the flat, the soft palate was completely separated from the posterior edge of the palate bones, by cutting upwards into the nares, and leaving an entire loose flap on each side, extending from the anterior angle of the cleft behind the alveolar processes, to the end of the uvula. This part of the operation required great care, in consequence of the firm adherence, thinness, and brittleness of the textures covering the bones, as well as from the angle above mentioned, which made it extremely difficult to avoid cutting through the soft parts at the kind of chink near the alveolar processes. This proceeding of Dr. Warren was not effected with the expectation of producing the ultimate closure of the fissure in the hard palate, but merely to allow the anterior part of the cleft in the soft palate to come close, without strain, on the ligatures, and the first ligature was consequently placed in the soft palate, and none in that part of the flaps which had covered the bones, fearing they would cause sloughing, from the peculiarity of the textures already alluded to. There was every reason, however, to believe, afterwards,

that if one or two ligatures had been placed on that part of the flaps, union would have taken place in the whole line at the same time, as it did in the soft palate, instead of gradually, as was really the case. Five sutures were placed in the soft palate, in the same order as before; and in consequence of the unequal length of the flaps, they were placed obliquely, in order that when they were tied, the two sides of the uvula should exactly correspond. In endeavoring to bring the flaps together, there was difficulty in making the left side advance sufficiently forward, without too much strain, and at last it was determined to divide the palato-glossus on that side. The difficulty was at once removed; the sutures were tied as in the other case, and the parts brought into the most satisfactory state, those in the hard palate being quite in opposition, although no ligature held them together. The operation lasted nearly an hour, notwithstanding there had been no hitch in any part of it, and every instrument fully answered its end. The only suggestion I would offer, and I do it with some diffidence, is to make that portion of the curved knife which is especially used in cutting, flat, instead of curved, as this particular shape is ill adapted for making a clean cut.

The poor boy bore the operation with great fortitude, and no bleeding occurred in this or the former operations. He passed the first afternoon very comfortably, without irritation or cough. At night his skin was rather hot, and his pulse 90. He slept well. On the next morning, early, he was sick, and vomited a good deal of bilious matter, it was supposed from his having taken some arrow-root made with milk. Some of the matter vomited passed through his nostrils. Afterwards he complained of slight headache. Pulse 90; skin rather warm, but moist. The parts were not the least deranged by the vomiting; and afterwards he went on perfectly well, as regarded his health, enjoyed his food with great relish, and was no farther troubled with irritation, or cough, or sickness. Immediately after the operation, he took thin gruel, which was repeated at pleasure. In the evening he had arrow-root, with three-quarters of a wine-glass of sherry; and at night an enema, composed of beef-tea,

one drachm of laudanum, and a glass of sherry. He continued his beef-tea enemata with sherry, night and morning, up to the sixth day after the operation, as well as the arrow-root and wine, with an egg occasionally beaten up in it, or isinglass in beef-tea, and similar food. On the sixth day he had wine and water, and ox-tail soup, thin puddings, and bread and milk. On the ninth day he had a mutton-chop, and, after that, game, or any other simple animal food. Two clear days after the operation, the line of contact was still perfect throughout, and the parts about the uvula, and between the third and fourth ligatures, were apparently firmly united. After the completion of the third day, the second suture was removed, and on the same evening, the third and fifth were also taken away. After the fourth day, an opening in the hard palate was visible to a slight extent, but the first suture immediately behind it held firmly, and, indeed, union seemed to have taken place between the opening and the ligature. After the fifth day, the first ligature was removed, and great anxiety was felt until next day, when all was found firmly held together, then the fourth and last ligature was removed, and all anxiety ceased. The opening in the hard palate enlarged to the extent of more than half an inch, and at one time a little backwards and laterally, as if the whole parts behind were contracting bodily more to the left side than to the right. On the seventh day he spoke a little, but he was not allowed to converse for some days after. He was well enough to leave before the fortnight was completed; and he continued to attend, at first, every two or three days, and then every day, and an attempt was made to produce granulations by the application of a strong solution of cantharides in acetic acid, without effect, so the part was left to itself, as the edges were quite close together. In a couple of months it was impossible to pass anything between them, although I believe they are not absolutely grown together even now.

One can scarcely imagine an operation of any importance more bloodless, or followed by less pain, by less local or constitutional disturbance, than in these three cases. At most, there was a slight attack of sickness, which speedily disap-

peared. Much of this tranquillity depended, no doubt on the early and continued exhibition of nourishment; but it may also be taken into account that the principal incision—that of the levator palati—is situated in the nares, where the parts are united, and thus removed, as it were, from the action of whatever is swallowed, and consequently not so liable to produce irritation. One cannot compare these cases strictly with those where food was not allowed; but the cases alluded to of M. Sédillot, where food was allowed, and the incisions carried completely through the whole thickness of the palate, abundant hæmorrhage occurred in one; in both it was found necessary to bleed afterwards, and in his second case there was a good deal of pain, local inflammation, and fever. Most of the operators who have succeeded to any extent in these cases have used their own peculiar methods, which have not been found to answer in the hands of others in their own or in other countries; and a method which would succeed, irrespective of extraordinary skill or luck of individual surgeons, was still a desideratum. This fact is difficult to account for. Some explanation of it may be found perhaps in a quotation from M. Sédillot's papers, where he speaks of the success of his own countryman, M. Roux, whose good fortune in these cases has been generally believed in this country to have been extraordinary. "The illustrious inventor of staphyloraphy," says M. Sédillot, "not having published the results of his vast experience on this subject, it is not known what has been the proportion of cures and failures in more than 110 cases, I believe, operated on by him. However, the general opinion is, that success has been the exception, and staphyloraphy has been by degrees abandoned by surgeons." We can scarcely imagine, on this side the channel, the *bonne foi* of any of our own eminent surgeons treated with so much freedom. Yet M. Sédillot must be too well acquainted with what is doing in France not to have some foundation for so decided an opinion. From the happy results of Mr. Fergusson's cases, from those of various other surgeons in London who have employed the same means, and from my own experience, I believe the desideratum of a

method, which will, to a considerable extent, be successful wherever it is used, and requiring only a good knowledge of the anatomy of the parts, and a fair amount of surgical skill, has been supplied, by the proposal to divide the levator-palati, the palato-pharyngeus, and, if necessary, the palato-glossus muscles.—*Lancet.*

EDITORIAL DEPARTMENT.

Dr. Gardette and his Proposition Again.—Since our last issue, Dr. Gardette has published in the Medical Examiner, a long and angry defence of his conduct and views with regard to dental education.

From the first we have been exceedingly reluctant to enter into controversy with that gentleman, for it was evident that his opinions were held as a permanent part of himself, and would be defended with all the ardor of a vehement nature, rather than with the fairness of a calm and dispassionate mind.

That he would confound criticism with resentment, and abuse argument with personal assault, was nothing more than we expected, and that in our attempts to defend dentistry against a most dangerous scheme of amalgamation with ordinary medicine, to which it was to surrender whatever of respectability it had acquired in years of struggle, and from which it was to receive nothing in return, we would bring upon ourselves present abuse and permanent enmity was what all experience taught us to anticipate. Nevertheless, we confess we were not prepared for such an ebullition of spleen as the recent publication in the Examiner, and for the sake of our former sincere regard for Dr. Gardette, we profoundly regret that he has permitted himself to make such an exposure of his feelings and temper. Of him we have always spoken considerately and respectfully. We appeal to our readers whether we have written a sentence, in all the controversy, at which a reasonable opponent could have taken offence? If any such can be shown, we will gladly retract it; but we are not conscious of any such utterance as calls for apology. Of us Dr. Gardette has written in terms the most offensive that a respectable journal could be expected to publish. That he has rather insinuated than asserted his meaning, neither lessens the offence nor conceals the purpose. We see in this, nothing more than the effect of the necessity that is laid upon contributors to reputable journals to avoid coarseness in the manner of their invectives.

These insinuations we cannot notice more particularly without humiliation, and we therefore will leave them, without attempt at defence, to find

a lodgement in any mind sufficiently unoccupied and greedy of evil to give them reception. It is sufficient for an honest mind, "*Nil conscire sibi, nullâ pallescere culpâ.*"

There is one statement made by Dr. Gardette, in which the readers of the Journal may feel somewhat interested. He charges us with refusing to publish a scientific article because it contained doctrines adverse to our own. In reply to this very grave accusation, we can only say, the Doctor has been misinformed. The article to which, we presume, he refers, was a review by an anonymous, though certainly, a very able writer, of a portion of the proceedings of the Mississippi Valley Association of Dental Surgeons, relating to questions propounded by Dr. Drake, concerning the cause of dental caries. It was rejected for a different reason, altogether, than the one stated by Dr. Gardette. Indeed, that had nothing to do with our refusal to publish it.

Our opposition to Dr. Gardette's scheme is based upon the fact, that it does not, and cannot provide for that thorough practical training so indispensable to a student of dentistry. If, then, it does not do this, the institution of a chair of dental surgery in, the different medical colleges of the country, *ostensibly* for the purpose of fitting men for the practice of dentistry, would, as a necessary consequence, *lower* rather than *elevate* the standard of professional qualification. We are far from underrating the value of medical knowledge to the dentist. We were among the first in this country to advocate it, and have written, perhaps, more than a hundred pages upon the subject, which, we are happy to believe, have been instrumental, in some degree, in awakening the attention of the profession to its importance. With a view of elevating the standard of qualification, provision was made in the constitution of the Baltimore College of Dental Surgery, for teaching *anatomy, physiology, pathology, therapeutics,* and the general principles of *surgery*—thus extending the curriculum of dental education far beyond what was before generally deemed necessary for the successful practice of this specialty.

Now, we claim, that the course of instruction which we advocate, is much *broader* and more *complete,* than that contended for by Dr. Gardette. If it could be done, we would require every student of dental surgery, to graduate both in medicine and dentistry. But we know this is impracticable, as it would be requiring twice as much of the dentist, as of the physician. We would also extend the curriculum of medical education, and require a full and thorough course of instruction in dental *anatomy, physiology* and *pathology* to be given either by a separate professor, or append the duty to one of the other chairs. This knowledge would certainly be of importance to the general practitioner, and having it, he would be more ready to admit to equal consideration the claims of the educated dentist. But the idea of fitting men for the practice of dental surgery, in the manner as proposed by Dr. Gardette, is a chimera which can never be realised.

Ohio College of Dental Surgery.—We are happy to learn from the Eighth Annual Announcement of the Ohio College of Dental Surgery, which we have just received; that, at no period since the organization of the Institution, have the faculty had so much cause for encouragement, and that many of the difficulties with which it has hitherto had to contend have been overcome.

The lectures will commence the first Monday in November, and close the 20th of February.

Medical Department of Pennsylvania College.—We learn from the annual announcement of this flourishing Institution, that the vacancy in the chair of Anatomy, occasioned by the decease of Dr. Wm. R. Grant, has been filled by the election of Dr. J. M. Allen, formerly Demonstrator of Anatomy in Jefferson Medical College, and Lecturer on Anatomy in the Philadelphia Association for Medical Instruction. Dr. John J. Reese has been appointed to the chair of Medical Chemistry and Pharmacy, made vacant by the resignation of Professor Atlee. A chair of Institutes of Medicine has recently been created in the school, and filled by the appointment of Dr. Francis G. Smith, the able senior editor of the Medical Examiner, and Lecturer on Physiology in the Philadelphia Association for Medical Instruction.

These appointments must give great satisfaction to the friends of the institution; and thus strengthened, the school can scarcely fail to attract to its halls, a fair proportion of the immense number of medical students who every year seek instruction at Philadelphia.

The lectures will commence the 11th of October, and continue until the 1st of March, making the course upwards of four months and a half.

Philadelphia College of Dental Surgery.—In acknowledging the receipt of the first annual announcement of the Philadelphia College of Dental Surgery, we tender the faculty the right hand of fellowship. We welcome them to a field of labor in which we, for some years, have been toiling. We do this, because we have the fullest confidence in the ability of the gentlemen to discharge the responsible duties they have severally assumed in this institution, and most sincerely do we wish them success in the noble enterprize in which they are engaged.

The names of the gentlemen filling the several chairs, we announced in a former number of the Journal. The lectures, commencing the first Monday in November, will continue four months. The means of instruction, which the Professors will be able to command, will secure to the students advantages which can no where be obtained from private tuition.

Baltimore College of Dental Surgery.—It will be seen by the annual circular which accompanies this number of the Journal, that this Institution has been removed from its old quarters, in Lexington street, to a more central location, at the corner of Lombard and Hanover streets. The change of location is decidedly better for several reasons. In the first place, its position is more central; in the second, the *Infirmary* is in the college building, which, before, was not only detached, but at some distance from it; and in the last place, the accommodations furnished by the exchange, are greatly superior.

Those who have, from time to time, honored the institution with a visit, know that the old building was not wanting in the requisites necessary for *practical* and *theoretical* instruction, but an edifice better adapted to the purposes of a Dental College, than the present, could scarcely be planned. The building, erected at a cost of upwards of thirty thousand dollars, is entirely new. It has two lecture rooms which are unsurpassed for beauty, convenience and comfort, by any medical institution in the country. The *Infirmary* is well lighted, and has accommodation for half a dozen or more operating chairs. The *mechanical room*, forming the crowning beauty, if any distinction of adapted excellence can be drawn, extends the whole length of the building, eighty feet, is splendidly lighted from above; in addition to which, it is provided with gas fixtures, and abundantly supplied with hot and cold water. The *dissecting room* is admirably suited for the purposes for which it is designed.

In a word, the faculty have great reason to congratulate themselves on the exchange, as they are now prepared to offer greater facilities for instruction, at a much greater cost, it is true, to themselves, but without any additional expense to the student.

Dr. W. H. Dwinelle, formerly one of the editors of this Journal, and known to our readers as an able writer, will start for Europe on the 28th of this month. He will go out in the Asia, and during his absence, will communicate for the Journal everything likely to be interesting to the profession, which may come under his observation while abroad. We wish him a pleasant trip, and a safe and speedy return.

Bond's Dental Medicine.—We are happy to learn that the first edition of this valuable work having been sold, a second is rapidly passing through the press, and will be published in a few weeks, by Messrs. Lindsay & Blakiston, of Philadelphia. We also learn that the work has been carefully revised and considerably enlarged.

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